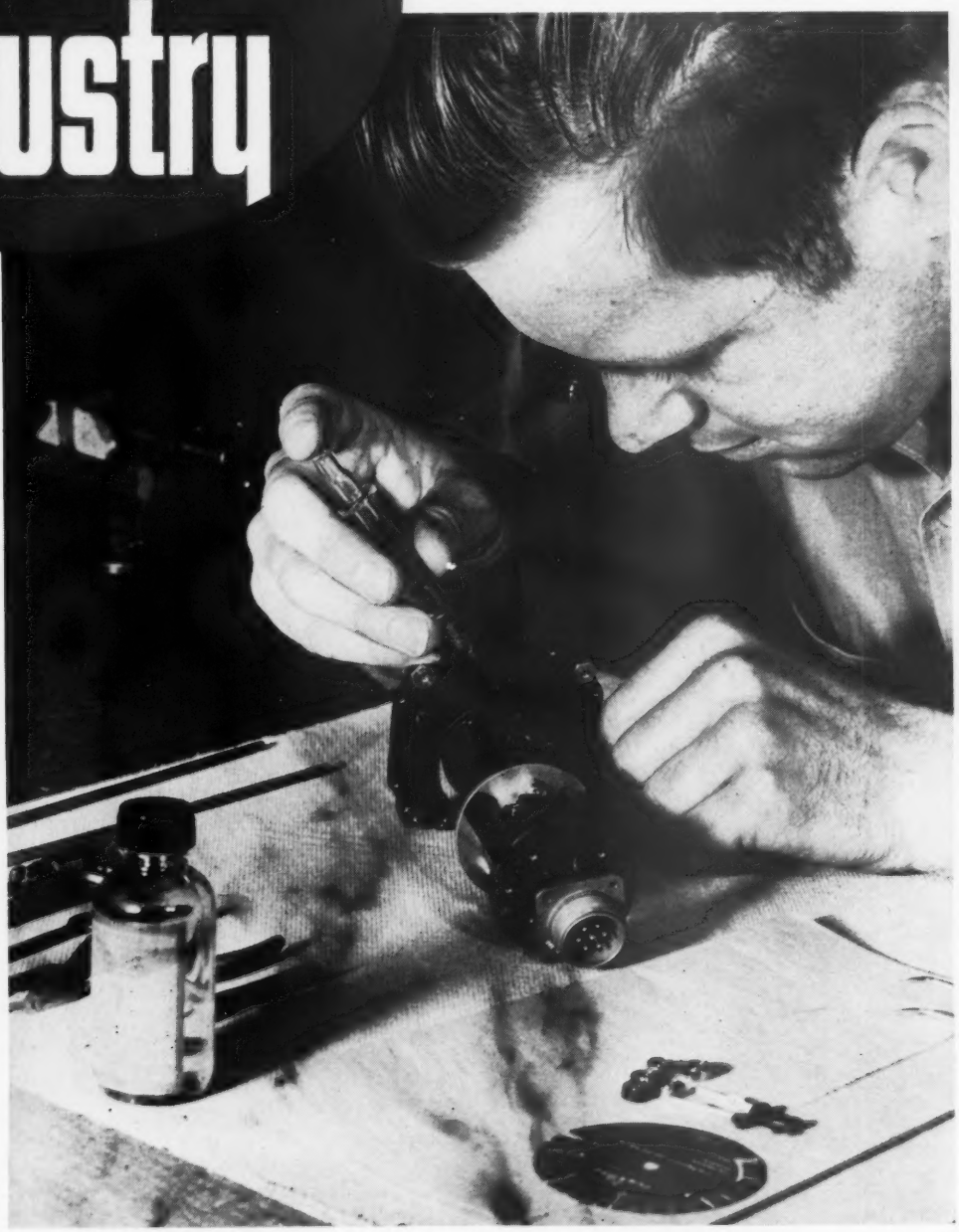
Western Industry

June 1955



Maintenance — it keeps little wheels moving as well as big. Here, lubrication of an aircraft instrument requires such tools as a jeweler's eye piece and hypodermic needle.

. . . see page 32

2d PLANT AND MAINTENANCE number

Your maintenance dollar • Lubrication • Standby power • Cooling towers
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Table of contents . . . page 4

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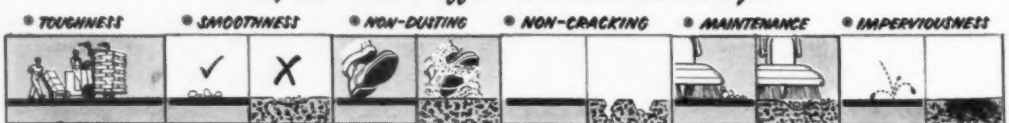

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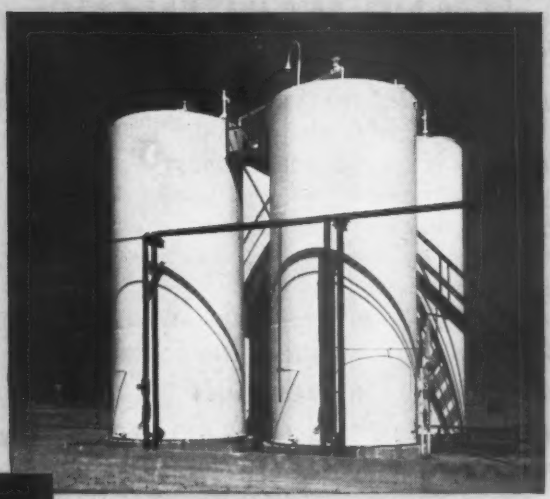
EPON® RESIN does it!

New paint lasts years ...resists corrosive spillage at Diamond Alkali plant



HERE'S HOW...

PAINT LEADS a hard life at the Diamond Alkali Company agricultural chemicals plant in Houston, Texas . . . and no ordinary paint can survive there for long!

A few reasons for paint failure: Processing vessels and storage tanks are subjected to spillage of chlorinated hydrocarbons and benzene, and some also to heat. In parts of the plant, painted surfaces are exposed to the highly corrosive fumes of hydrogen chloride and sulfuric acid.

In their search to find a tougher, longer lasting paint, Diamond Alkali maintenance men tried coatings of many types, including heavy duty maintenance finishes. Some "washed off" immediately; some lasted 6 to 8 months. Finally, Epon resin coatings based on the XA-200 formulation were tried — and found outstandingly successful.

The Epon cold-cured paint, applied by spraying throughout the entire plant, has been in service for *more than two years with no failure.* Painting costs — for both material and labor—are a mere fraction of what they formerly were, reports Diamond Alkali.

Call on our sales offices for names of suppliers who sell Epon resin coatings for your needs. Write for the full Epon coatings story in the new brochure, *"Planning to Paint a Pyramid?"*

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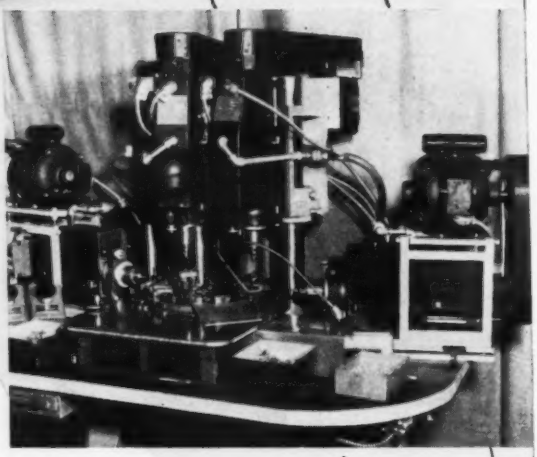


An extra second or so drilling a hole may not mean much to a woodpecker. But in today's cost picture it means dollars to you.

If you have any part in which you are drilling or tapping two or more holes in any size up to 1/4" or 5/16", The Bellows-Locke Drill Unit offers practical opportunities for substantial cost reduction.

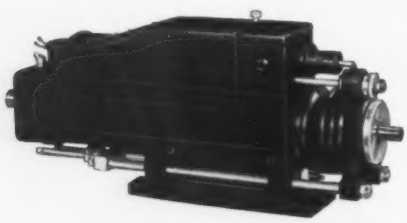
It is particularly effective as a basic component for toolroom-built special purpose drilling and tapping machines. It is compact, streamlined, relatively light in weight, can be installed in any angle in any plane. Any number of units can be easily synchronized and interlocked for accurately timed sequence operation.

The spindle is electrically driven (either pulley drive or direct motor drive). Rapid advance and retract is by pneumatic power. Feed rate is hydraulically controlled. All three circuits: electric, pneumatic and hydraulic are interlocked for simple, positive push-button control.

Major cost reductions are often the accumulated total of many minor savings. Look at your drilling and tapping costs with a critical eye.

WRITE FOR THIS BOOKLET—

Describes the Bellows-Locke Drill Unit in detail — shows how and where it can be used to best advantage. Free on request. Address: The Bellows Co., Dept. WI 655 Akron 9, Ohio. In Canada: Bellows Pneumatic Devices of Canada, Ltd., 4972 Dundas St., W. Toronto, Ontario, Canada.



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In addition to maximum protection, the installation of a Horton elevated tank often pays for itself through reduced fire insurance premiums.

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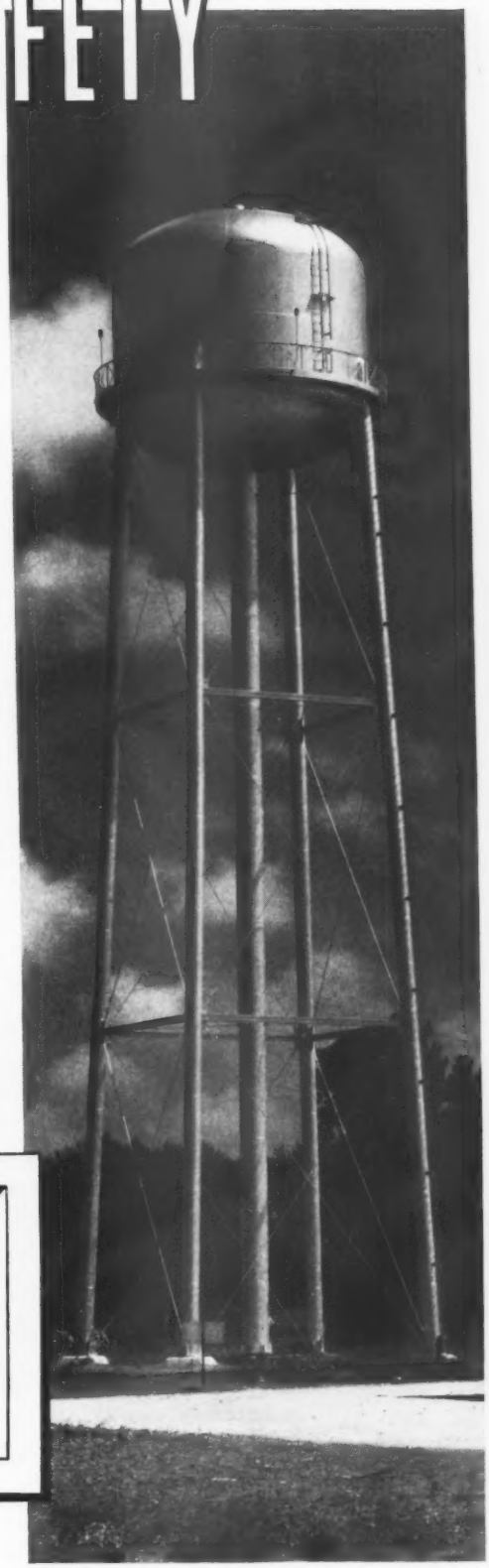

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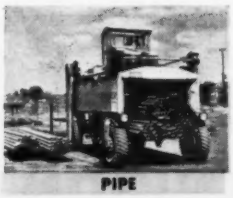
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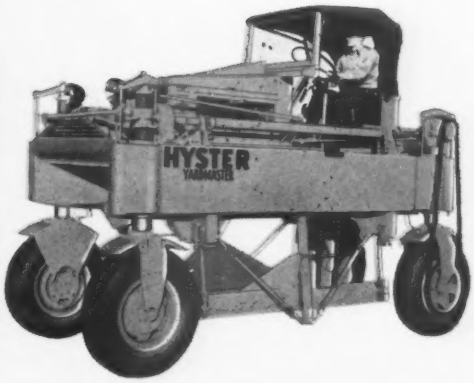


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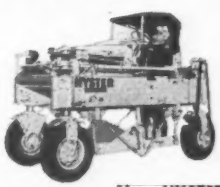

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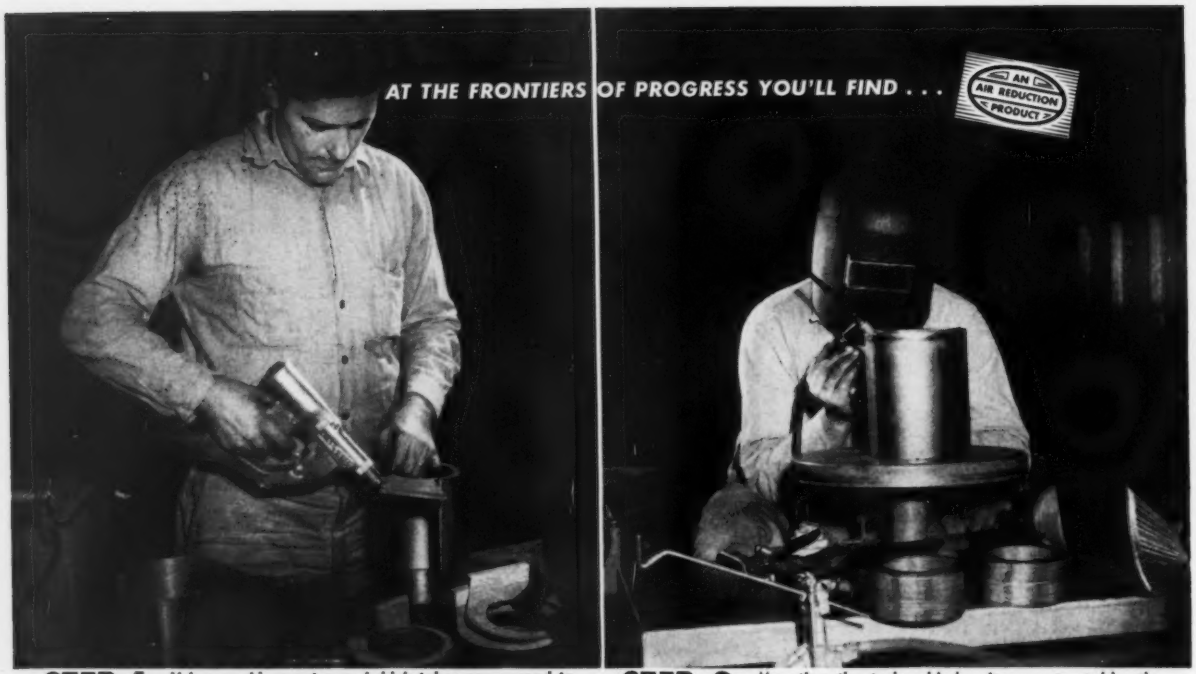

STEP 1. Using an Aircospot gun, (which takes one second to make a strong, sound spot weld), the Falstrom operator tack-welds flange on a metal cover. An average of 10 tacks are needed. The metal is 16 gauge mild steel.

STEP 2. Mounting the tack-welded unit on a turntable, the same operator exchanges the Aircospot gun for an H8-B Heliweld holder. The Airco Heliweld process joins the circumferential seam at a speed of 16 inches per minute.

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...speeds seam-welding 75% with HELIWELDING!

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One, or both, of these Airco inert-gas shielded arc welding processes can provide similar savings in your particular operation. Contact your local Airco Sales Representative or Authorized Airco Dealer for an on-the-spot demonstration in your plant—or—write Airco direct for complete information. Request Aircospot Catalog #2315, Heliwelding Catalog #2300.

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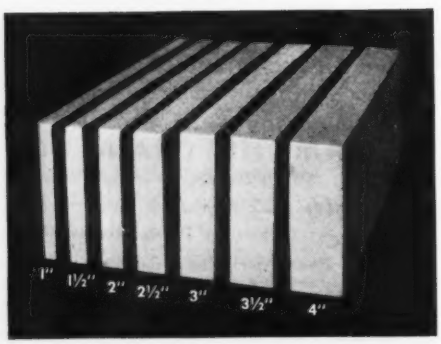

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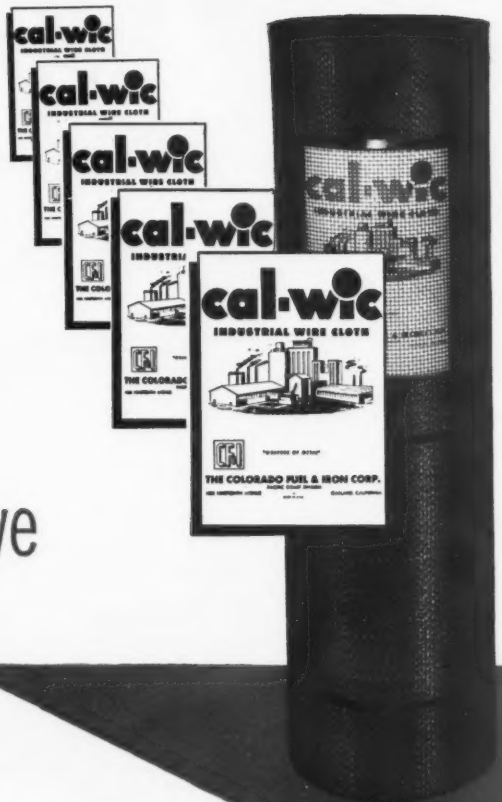

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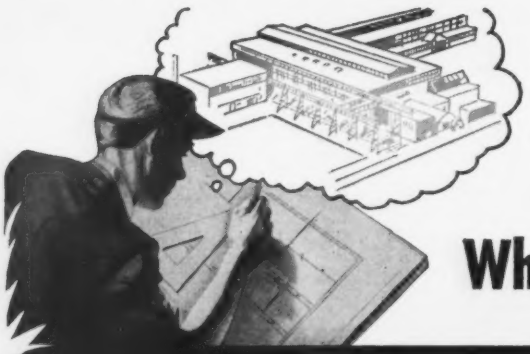
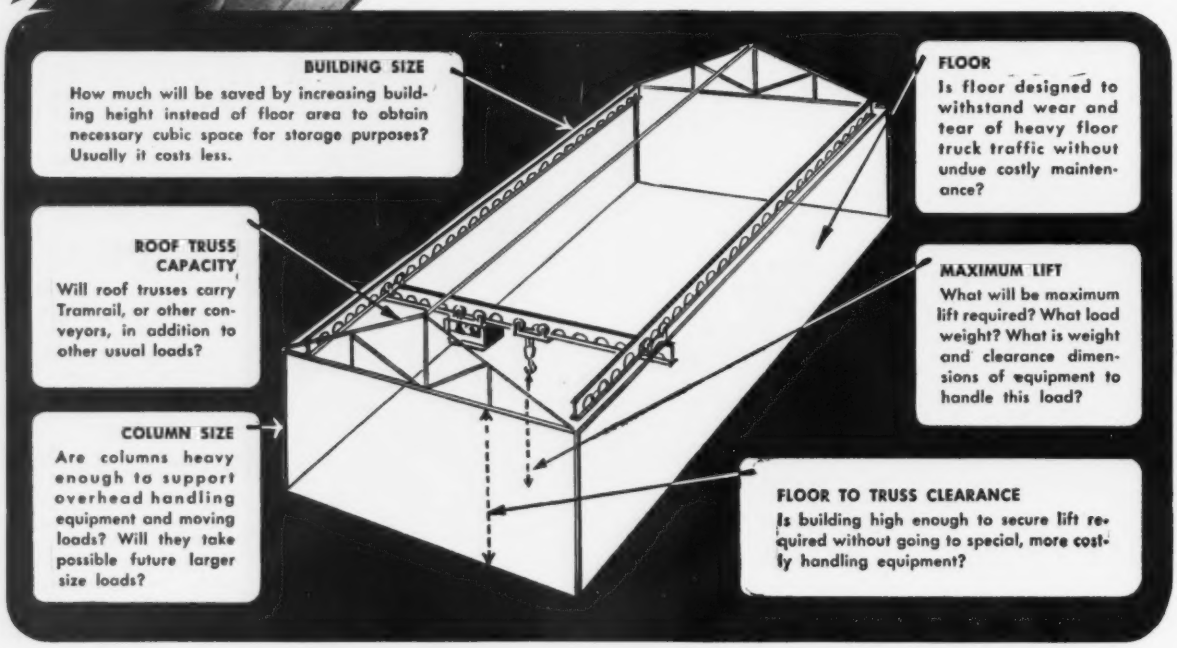


Don't Forget *Materials Handling* When Designing the Building



The foremost demand of a new factory building, whether for production or storage, is that its design and construction aid overall operating efficiency to the utmost. Thus, the building becomes more than just an enclosure, but is actually a vital part of the manufacturing process.

It is, therefore, imperative that the various steps entering into the making of an item be thoroughly considered when the building is designed. One of the most important of these concerns materials handing because this item often amounts from 25% to 50% of the total production cost, and, also, because it is plant-wise in nature.

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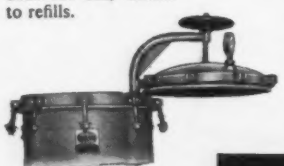

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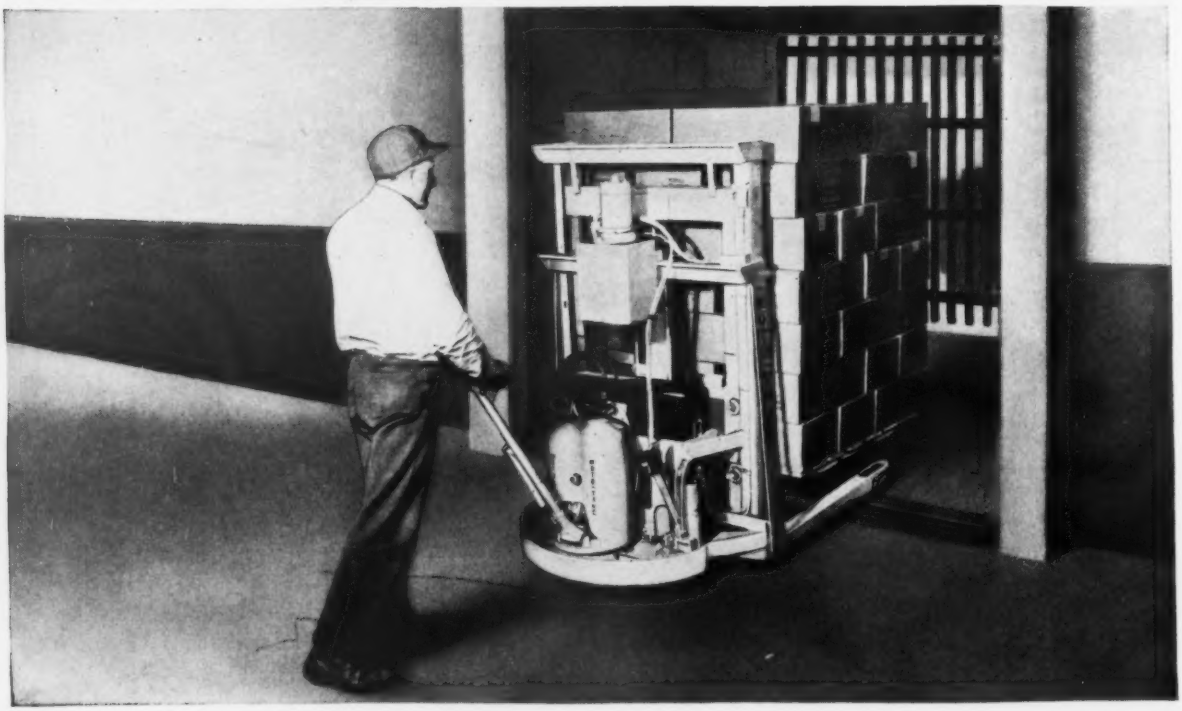


ON THE ELEVATOR... with FREIGHT CAPACITY to Spare!

Excessive re-handling of loads because of limited elevator capacities is often completely eliminated with Moto-Trucs. The light, yet powerful compactness of a Moto-Truc lets you move load *and truck* into an elevator with *weight capacity to spare.*

The complete line of Moto-Trucs are designed and built for economical, space saving operation. Inch for inch . . . pound for pound . . . Moto-Trucs are the smallest, yet the most powerful walkie trucks in the world.

Write for **Bulletin No. 54** ...it covers the complete Moto-Truc line.

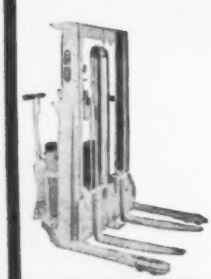
MOTO-TRUC
Designers FOR THE INDUSTRY
PATENTED

The MOTO-TRUC Co
Representatives in Principal Cities

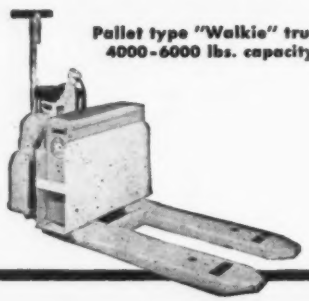
1963 E. 59th St. • Cleveland 3, Ohio
Pallet... Platform... Hi-Lift Trucks
The *Originators* of the Walkie and Small Rider Type Truck.

a MOTO-TRUC for every purpose...

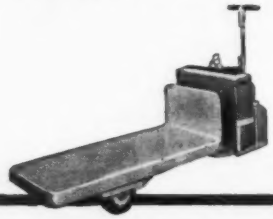
Hi-lift "Walkie" type 3000-4000 lbs. capacity



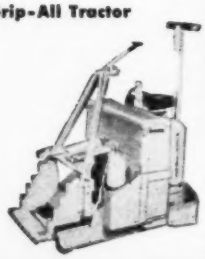
Pallet type "Walkie" truck 4000-6000 lbs. capacity



Platform "Walkie" type 4,000-10,000 lbs. capacity



Grip-All Tractor



National Supply produced this rolling mill gear box assembly

...from design to delivery

This order specified a complete gear box for a rolling mill, with elements housed to provide for 4 take-off shafts. An over-all gear speed ratio of 543 to 1 was required, with a final speed of 1½ RPM on the 4 shafts.

The work started immediately in National's Torrance Plant. Design details were readily completed. Fabrication, machine work and assembly followed according to schedule. With complete facilities for producing such special jobs, National did all of the work under one roof.

The result—a precision-built, heavy-duty gear box, ready for long, dependable action in the customer's mill. And behind this finished product, like hundreds of other special jobs National does for western industry, are three vital ingredients—complete facilities, engineering skill and experienced plant operators. You can quickly put them to work for your needs, with a letter or phone call to the Industrial Products Division.

THE NATIONAL SUPPLY COMPANY

INDUSTRIAL PRODUCTS DIVISION

TORRANCE, CALIFORNIA • LOS ANGELES AREA

Ideal Pressed Steel Forgings • Billets and Large Bars
Steel Castings and Special Machinery

Melting • Forging • Casting • Machining • Heat Treating
Assembling • Welding • Testing

Western Industry EDITORIALS

The "maintenance dollar"

OUT OF EVERY hundred dollars you get for your product or service, how much of it has to go back into maintenance?

Is your "maintenance dollar" higher than it ought to be? Does it represent a good preventive maintenance program, a passable one, or a poor one? Or is "break it and fix it" the only "program" you have?

As the cost of maintenance seems to be a relatively unexplored subject, WESTERN INDUSTRY felt it highly appropriate to devote the first article in this second annual plant maintenance number of our magazine to a report of what some companies in the West consider their "maintenance dollar" to be. While the information presented is on the sketchy side, partly because the questionnaire may have been found inadequate or misleading, nevertheless we feel it points up the importance of the subject significantly. All in all, the figures are convincing evidence that maintenance deserves greater recognition than it has had heretofore.

What are apparently high preventive maintenance costs may not be undesirable. In fact, we heard just the other day from the manager of a Western branch plant of his experience during a year's transfer to one of the Eastern plants of the same company. For a period of ten years no preventive maintenance at all had been done in this Eastern plant, but while he was there an incredible sum had to be spent in one year to put the place into thorough working shape again.

"Too busy to set up a preventive maintenance program" . . . famous last words.

Maintenance pay-off

ALTHOUGH the above editorial indicates that maintenance has a long way to go before it receives adequate attention, there are highly gratifying signs that industry is rapidly becoming aware of this deficiency.

For example, the national maintenance conference and show held in the East has grown tremendously from a small beginning. The West had its first Western Plant Engineering and Maintenance Conference and Show in Los Angeles last year and is having a repeat performance there July 12-14. The Instrument Society of America is holding a "maintenance clinic" in connection with its first annual conference to be held in the West (Los Angeles, September 12-16). The American Petroleum Institute's Division of Refining had a session on refinery maintenance in connection with its mid-year meeting in St. Louis last month.

Just one idea picked up by any plant manager, plant engineer, maintenance supervisor (or anyone else in the company, for that matter) at the conference or exhibits in Los Angeles in July, is likely to pay off many times over in your preventive maintenance program.

A dollar saved through good maintenance is just as good a dollar as one taken in through more sales—and is less taxable.

"Let them eat cake"

NO, it isn't Marie Antoinette this time, offering this advice of a queen to a starving French populace crying for bread. It's Cornell-Dubilier.

But with this difference: when they opened their electronics research laboratory in Venice (California) in April they didn't offer us advice (nor were we crying for bread, either). Instead, they just sent us, parcel post, a cake decorated with "45th birthday" in celebration of the joint occasion of the birth of the lab and this anniversary of the founding of their company.

Whether we will ever be so honored again is immaterial (well, almost), but it does prompt us to observe that the birth of any research laboratory in the West is cause for celebration. The West hasn't been too well situated in years past as regards research; in fact, a survey by the Washington State Institute of Technology revealing the lumber industry, among others, in that state as being very backward in research caused the West Coast Lumbermen's Association to feel deeply grieved at this accusation.

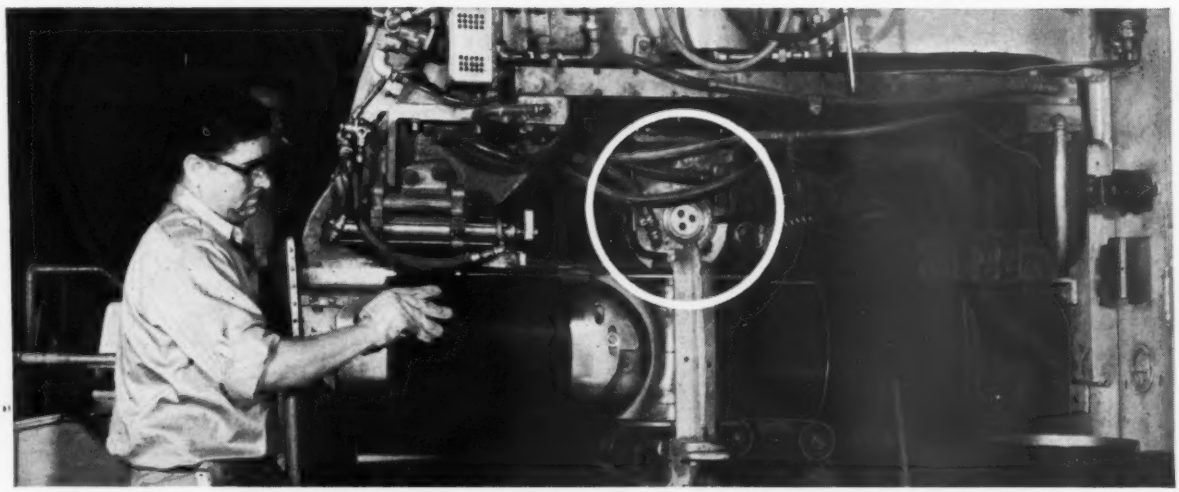
Fortunately for the West, we have been catching up somewhat, mostly in the industries where technology is already well advanced.

And just what is research, anyway? Basically, isn't it just taking time out to think? Can there ever be too much of that?

Standard Engineer's Field Report

Another new product development
CALOL INDUSTRIAL GREASE

New grease replaces 3 specialized greases, stops leakage from welding-head bushings!



CALOL INDUSTRIAL GREASE, an entirely new grease made with a completely different synthetic thickener, has proved its outstanding lubricating qualities in all types of bearings under toughest conditions in a wide variety of operations.

Rheem Manufacturing Co.'s fabricating plant, Richmond, California, for example, eliminated leakage from welding-head bushings (see photo) even at temperatures from 400 to 500°F. and replaced three specialized greases previously used. Now in use throughout the plant, Calol Industrial Grease functions perfectly in dry-oven fans and motors, large journal bearings, high- and low-speed anti-friction bearings; gives better lubrication under all operating conditions.

CALOL

TRADEMARK "CALOL" REG. U. S. PAT. OFF

FREE FOLDER gives you complete information on New Calol Industrial Grease. Write or ask for it today.

FOR EXPERT HELP on lubrication or fuel problems, write or call your Standard Fuel and Lubricant Engineer or Representative, or write Standard Oil Company of California, 225 Bush St., San Francisco.

NEW CALOL INDUSTRIAL GREASE is strong in all lubricating qualities, eliminates need for most specialized greases in your plant.

NEW CALOL INDUSTRIAL GREASE speeds greasing time, prevents errors, cuts down space and stock control trouble, won't change in storage.

Gives these outstanding advantages:

- Mixes with any grease...forms safe mixtures, eliminates bearing removal and cleaning when you change brands.
- Exceptionally high melting point of 500° F.+ . . . thorough lubrication in extreme high-temperature operations.
- Extreme work stability...only slight softening after 1000-hour test that turns most greases to fluid in 4 to 20 hours.
- Excellent wear-prevention qualities . . . proved in service with steel-on-steel, steel-on-bronze, steel-on-babbitt bearings.
- Outstanding rust protection...in service or lay-up even in hot, moist conditions.
- Unusual water resistance...does not emulsify after more than a week in boiling water; conventional greases disintegrate after 4 min.
- Non-corrosive...will not corrode copper or any ferrous or non-ferrous metals.
- Pumpable over wide temp. range . . . Medium grade pumps through air dispensers at 3°F.

STANDARD OIL COMPANY OF CALIFORNIA

LETTERS

Contributions to this column from our readers are welcome. Names will be withheld from publication if requested. Unsigned letters will be disregarded.

Steam trap education

Editor, WESTERN INDUSTRY:

Your May issue, 1955, of WESTERN INDUSTRY carries the second part of an article, "Steam Traps—How to Install . . . " This is an excellent article and I am wondering if you would send me three tear-sheets of this second part and of the first part which appeared in the April issue. I would like to furnish these articles to some people who do this kind of work in our company.

RICHARD C. CROOK
Assistant Manager-
Project Engineer
The Zia Company
Los Alamos, N. M.

LP-gas article of interest

Editor, WESTERN INDUSTRY:

Kindly forward two copies of your April 1955 issue of WESTERN INDUSTRY containing the article on LP gas combustion equipment as used on industrial lift trucks.

W. D. FLEMMING
Maintenance Engineer
Anglo-Canadian Pulp and
Paper Mills, Ltd.
Quebec, P. Q., Canada

How to schedule work loads

Editor, WESTERN INDUSTRY:

I would be interested in any additional information on practice by job shops in handling scheduling and machine load.

GLENN C. CALVIN
Production Control Supervisor
Tyce Engineering Corp.
Chula Vista, Calif.

Paint

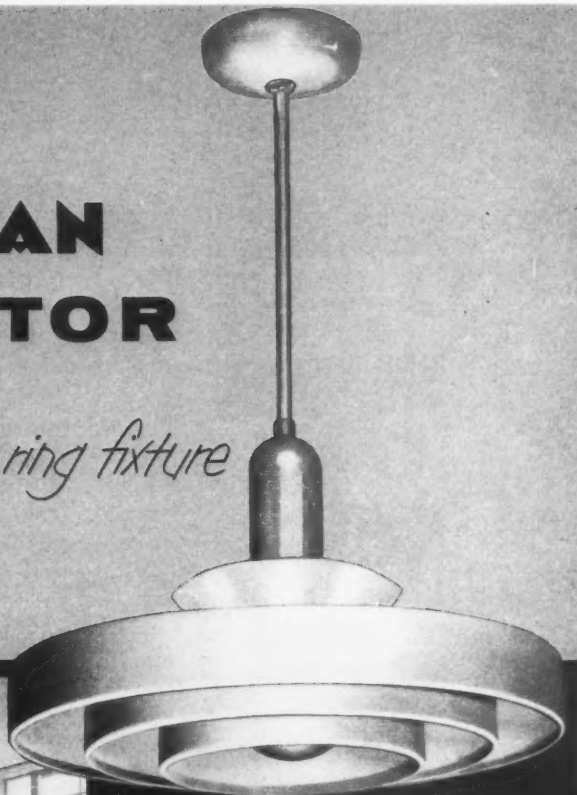
Editor, WESTERN INDUSTRY:

Your March 1955 issue carried a story written by a Mr. Bennett on the Colorizer Paint innovation, and I should like to obtain three reprints of the article.

DR. WILLIAM H. DAY
1219 E. Warnock Ave.
Salt Lake City 6

SMOOT-HOLMAN EDUCATOR

the TOP QUALITY *ring fixture*



easier on the eyes

easier on the budget, too!

Here is the ultimate in high seeing efficiency, low brightness illumination created by Smoot-Holman research engineers. The Educator's quality features mean important savings for schools, offices, or stores. For example, an ingenious canopy plate, mountable in minutes means rock-bottom installation charges. And rolled concentric rings assure low cost, easy maintenance... can't collect dust or insects. A low heat porcelain enameled socket cover and correct neck shielding which eliminates glare and creates an even ceiling pattern are plus values in beauty and seeing efficiency... For that next important lighting job, specify Smoot-Holman.

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SMOOT-HOLMAN
INGLEWOOD, CALIFORNIA ®
MADE IN U.S.A.

Sales Offices in Most Principal Cities.
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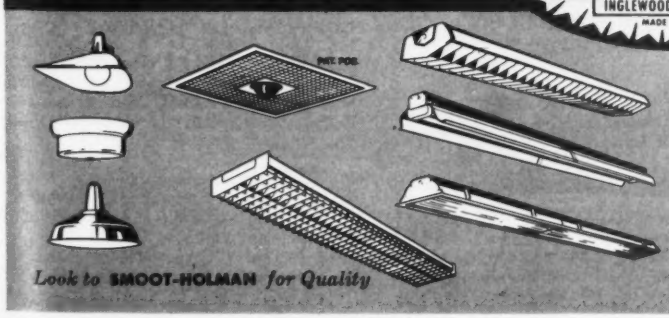

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P. O. BOX 398 • DEPT. 106 • INGLEWOOD, CALIFORNIA

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CALENDAR OF MEETINGS

JUNE 19-22—*American Industrial Bankers Assoc.* conference, Fairmont Hotel, San Francisco. Contact Myron R. Bone, vice president, 1208 Lincoln Bank Tower, Fort Wayne 2, Ind.

JUNE 19—JULY 1—*Series of one-week management conferences,* Industrial Relations Section, California Institute of Technology, Pasadena, Calif. Contact Robert D. Gray, Director, Industrial Relations Section, CIT.

JUNE 20-21—*Fir Plywood Golden Jubilee,* Portland. Contact Douglas Fir Plywood Assoc., Tacoma, Wash.

JUNE 20-23—*Forest Products Research Society* national convention, Seattle.

JUNE 26-29—*American Society of Heating and Air Conditioning Engineers,* St. Francis Hotel, San Francisco. Contact A. V. Hutchinson, Executive Secretary, 62 Worth St., New York 13.

JUNE 27-28—*Wyoming Liquefied Petroleum Gas Assoc.,* annual convention, Hotel Townsend, Casper, Wyo. Contact LPGA, Inc., 11 S. LaSalle St., Chicago 3.

JULY 12-14—*Second Western Plant Maintenance and Engineering Show and Conference,* Pan-Pacific Auditorium, Los Angeles. Contact Clapp & Poliak, Inc., 759 Monadnock Bldg., San Francisco.

JULY 25-29—*14th Annual Stanford Business Conference,* Stanford University, Calif. Contact Dean J. Hugh Jackson, Graduate School of Business, Stanford University, Stanford, Calif.

AUG. 15-26—*Training Conference and Workshop for Industrial Sales Representatives,* Santa Barbara College, University of California, 129 E. Carrillo St., Santa Barbara, Calif. Contact Professor John A. McClure.

AUG. 22-23—*Symposium on Electronics in Automatic Production,* sponsored by Stanford Research Institute and National Industrial Conference Board, Sheraton-Palace Hotel, San Francisco. Contact Public Relations, Stanford Research Institute, Stanford, Calif.

AUG. 24-26—*Western Electronic Show and Convention,* Civic Auditorium and Fairmont Hotel, San Francisco. Contact Mal Mobley Jr., Business Manager, 344 North La Brea Ave., Los Angeles 36.

AUG. 28-30—*Liquefied Petroleum Gas Assoc.,* District 2 convention and trade show, Sheraton-Palace Hotel, San Francisco. Contact LPGA, Inc., 11 S. LaSalle St., Chicago 3.

SEPT. 12-16—*Instrument Society of America,* 10th annual conference and exhibit, Shrine Exposition Hall and Auditorium, Los Angeles. Contact Fred J. Tabery, Fred J. Tabery Corp., 3443 S. Hill St., Los Angeles 7.

. . . More on page 30.

Make All Your Low Pressure Hose Lines from This *NEW* Aeroquip Kit

SPEED REPLACEMENT! CUT COSTS! REDUCE INVENTORY!

DURABLE ALL-STEEL BOX

Back of fitting tray can be raised for convenient use

Kit 5144 contains 93 fittings and adapters in 20 sizes and types

Compartment of Kit 5144 contains 24 ft. of ¼" hose, and 24 ft. of ⅜" hose

Pull out hose, measure it, and cut with knife

See us at the Western Plant Maintenance Show, July 12-14, Los Angeles. Aeroquip Booth No. 425

Many users have requested a permanent-type container for Aeroquip *SOCKETLESS* fittings and hose. So this durable all-steel Kit 5144 is now available. It contains an inventory of hose, fittings, and adapters in types and sizes that will meet practically all low pressure applications.

With remarkable new Aeroquip *SOCKETLESS* fittings and hose, fuel, oil, water, and air lines can be made and installed *extra fast* on all kinds of industrial and mobile equipment. Field replacement is simplified because Kit 5144 is compact (12½" x 12½" x 6½" when closed) and it will stand up in field service.

Aeroquip *SOCKETLESS* fittings and hose are saving time and money for users in every industry. Get the complete story from your Aeroquip distributor, listed in your Yellow Page Directory, or write us.

Also Available: 15-Cell Kit No. 5143 with 24 feet of ¼" hose and 71 fittings and adapters in same box.

Aeroquip

REG. TRADEMARK

AERO-COUPLING CORPORATION

(A Subsidiary Of Aeroquip Corporation)

3015 Winona Avenue, Burbank, Calif.

SALES OFFICE and WAREHOUSE for OREGON, WASHINGTON and IDAHO: SPARKS-WILLS, INC., 1624 S. E. GRAND AVE., PORTLAND 14, ORE.

CALENDAR

. . . Begins on page 28.

SEPT. 16-22—*American Society for Testing Materials*, Pacific Coast Meeting, Hotel Statler, Los Angeles. Contact offices of Society, 1916 Race St., Philadelphia 3, Pa.

SEPT. 25-29—*Master Brewers of America* convention, St. Francis Hotel, San Francisco. Contact Henry Henius, convention chairman, 2601 Newhall St., San Francisco.

OCT. 5-9—*World Plastics Fair and Trade Exposition*, National Guard Armory, Exposition Park, Los Angeles.

OCT. 10-12—*American Mining Congress*, 1955 metal mining and industrial minerals convention, Las Vegas, Nev.

OCT. 12-14—*Gas Appliance Manufacturers Assoc.* annual meeting, Palm Springs.

OCT. 17-19—*American Gas Assoc.-Pacific Coast Gas Assoc.* annual meeting, Los Angeles.

OCT. 18-30—*34th Pacific Coast Management Conference*, Hotel Claremont, Berkeley. Contact Everett Van Every, President, California Personnel Management Assoc., 2180 Milvia St., Berkeley 4, Calif.

OCT. 23-25—*Western Regional Frozen Food Convention*, Hotel Mark Hopkins, San Francisco. Contact Harry Lerner, Executive Secretary, 675 Monadnock Bldg., San Francisco.

OCT. 27-29—*Pacific Northwest Personnel Management Assoc.*, Davenport Hotel, Spokane. Contact Eric Brown, General Conference Chairman, c/o Spokane Chamber of Commerce, or phone RI-5161.

OCT. 30-Nov. 1—*Pacific Northwest Trade Assoc.* fall conference, Seattle, Wash. Contact Association office, Vance Building, Seattle 1.

Nov. 1-5—*World Symposium on Applied Solar Energy*, sponsored by Stanford Reseach Institute, Assoc. for Applied Solar Energy, and University of Arizona, Hotel Westward Ho, Phoenix. Contact Henry B. Sargent, president and general manager, Arizona Public Service Co., Phoenix.

Nov. 7-8—*California Fertilizer Assoc.*, 32nd annual convention, Hotel Mark Hopkins, San Francisco. Contact Sidney H. Bierly, executive secretary and manager, CFA, 475 Huntington Drive, San Marino 9, Calif.

Nov. 8-11—*American Council of Independent Laboratories, Inc.*, Hotel Westward Ho, Phoenix, Ariz. Contact Claude McLean, Arizona Testing Laboratories, 817 W. Madison St., Phoenix.

Nov. 9-10—*Council of Profit Sharing Industries*, 8th annual conference, Huntington-Sheraton Hotel, Pasadena, Calif. Contact John C. O'Keefe, field secretary, 919-D E. California St., Pasadena 5.

Nov. 14-17—*American Petroleum Institute* annual meeting, Fairmont, St. Francis, Palace, and Mark Hopkins Hotels, San Francisco.

Electronic Air Cleaning vs. Air Filtering?

Fact:

Test Proves Westinghouse PRECIPITRON®

Removes Over 5 Times More Airborne Dirt

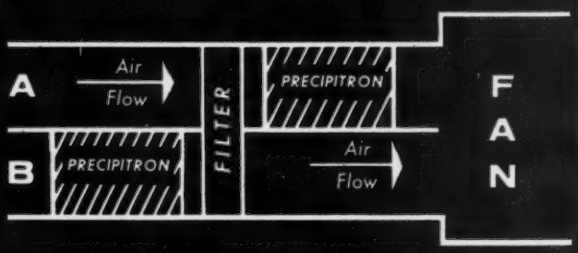


FIGURE 1

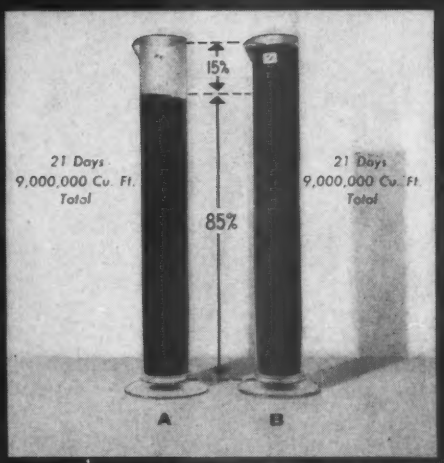


FIGURE 2

Dirt scraped from PRECIPITRON cells

How much better is PRECIPITRON Electronic Air Cleaning for removing dirt particles from air for ventilating and air conditioning? The answer is shown by this dramatic research test, comparing the performance of a conventional mechanical air filter with PRECIPITRON.

In the test, equal quantities of outdoor air were drawn through two identical channels as shown in Figure 1. In Channel A, air was first filtered and then PRECIPITRON-cleaned. A duplicate filter was placed in Channel B after the PRECIPITRON to balance the air flow.

After 21 days of operation, a total of 9,000,000 cubic feet of air had passed through each channel. The accumulated dirt was recovered from the PRECIPITRON collector cells in each channel, and carefully weighed.

In Figure 2, Column B indicates the performance of the two air cleaners in Channel B (PRECIPITRON first). The mechanical filter did not collect any measurable amount of dirt.

Column A indicates the performance of the two air cleaners in Channel A (filter first). **Only 15% of the dirt was removed by the mechanical filter.**

85% passed through and was trapped by the PRECIPITRON—over 5 times as much, and that portion contained damaging submicroscopic particles.

MORE FACTS? Call your nearest Westinghouse-Sturtevant Sales Engineer . . . he's the "Man with the Facts" on electronic air cleaning . . . or fill in the coupon below.

WESTINGHOUSE AIR HANDLING

YOU CAN BE SURE...IF IT'S

Westinghouse

J-80442

Westinghouse Electric Corporation
Sturtevant Division, Dept. 2E
Hyde Park, Boston 36, Mass.

Please send more facts on your PRECIPITRON.

NAME AND TITLE .....

COMPANY .....

CITY ..... STATE .....

THIS MONTH'S COVER

OIL BY THE DROP —and by the gallon

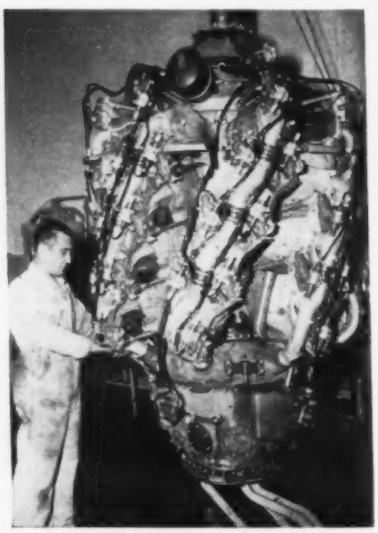
AIRCRAFT MAINTENANCE requires oil in quantities ranging from hundreds of gallons for engine lubrication to a tiny drop for delicate instrument lubrication.

The Pacific-Alaska division of Pan American Airways, headquartered at San Francisco International Airport, is responsible for the maintenance of 26 ships. Sixteen of these are Boeing Stratocruisers.

Heavy, intermediate, and light maintenance is performed on the ships every 1,800 flight hours. The ships receive heavy maintenance on certain portions, intermediate on others, and light work on other sections.

When the ship returns for its next maintenance period, heavy maintenance is performed on portions previously given intermediate treatment; intermediate treatment is given portions of the ship previously given light work; and so on.

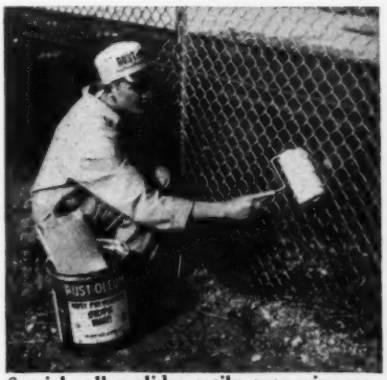
This progressively planned schedule provides more actual hours of flight use on the Pan American craft than if the ships were given an over-all heavy, an over-all intermediate, and an over-all light treatment.



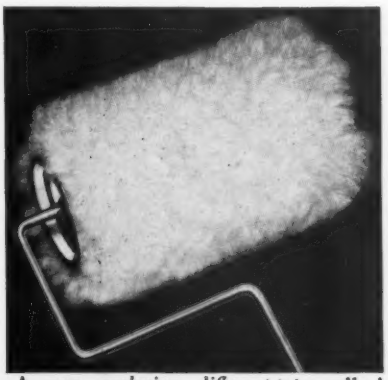
AIRCRAFT ENGINES are completely dismantled and rebuilt periodically at Pan American Airways' San Francisco maintenance base.

Cut wire fence re-coating costs!

Users Report Savings of 30% to 40% With Rust-Oleum Extra-Long Nap Lamb's Wool Roller!



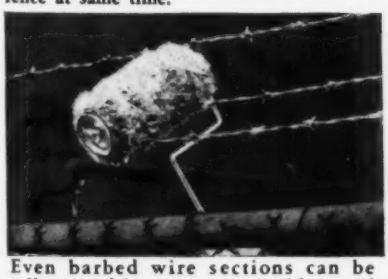
Special roller glides easily over wire sections. 99% of the material is used on the fence—*not* on the workers, *not* on the ground.



A *new, exclusive, different-type* roller! Greater diameter, specially-selected skins, and Extra-Long Nap Lamb's Wool give more coverage . . . *faster!*

Extra-Long Nap Wool plus Rust-Oleum's *exclusive* penetrating qualities work in to coat approximately 70% of other side of fence at same time.

Man follows with "dry" roller on opposite side of fence to catch and use surplus and quickly coat remaining 30% of the wire sections.



Even barbed wire sections can be roller-coated in one easy pass with special Rust-Oleum Roller.

On longer fences, brush men, as part of fast moving "team", follow roller men to brush pipe framework and arms.

STOP with RUST!

RUST-OLEUM

ATTACH TO YOUR LETTERHEAD—MAIL TODAY!

RUST-OLEUM CORPORATION
2527 Oakton Street, Evanston, Illinois

Please show us how your new Extra-Long Nap Lamb's Wool Roller will cut our wire fence re-coating costs. Include prices, complete Rust-Oleum literature and nearest source of supply. We have approximately_____yards of wire fencing.

Contact Your Nearest Rust-Oleum Distributor Today

ARIZONA

ALEMITE STEWART-WARNER
326 N. Third Avenue
Phoenix
Phone: ALpine 8-5721

CALIFORNIA

BARNES & DELANEY
Atlantic & Willow Sts.
Long Beach
Phone: LOng Beach 4-1601

RALPH-PUGH CO., INC.
530 Howard Street
San Francisco
Phone: SUtter 1-6505

REPUBLIC SUPPLY CO.
2600 S. Eastland Ave.
Los Angeles
Phone: PArkview 8-7151

REPUBLIC SUPPLY CO.
1919 Williams St.
San Leandro
Phone: LOckhaven 2-0414

SACRAMENTO RUBBER CO.
721-723 "J" St.
Sacramento
Phone: GIlbert 2-3847

VALLEY FOUNDRY & MACHINE WORKS
2718 E. Avenue
Fresno
Phone: 3-6135

COLORADO

GEORGE BROTHERS
973 Broadway
Denver
Phone: TAbor 5-8747

STICKNEY'S, INC.
Ft. Morgan
Phone: 475

UNION SUPPLY CO.
P.O. Box 6735
Stockyards Station
Denver
Phone: Alpine 2091

IDAHO

WESTERN EQUIPMENT CO.
4009 Fairview Ave.
Boise
Phone: 3-5401

OREGON

STANDARD SUPPLY CO.
934 S.E. Sixth St.
Portland
Phone: Vermont 2167

UTAH

WILLIAMSEN BODY & EQUIPMENT CO.
933 Wall Street
Ogden
Phone: 2-7503

INDUSTRIAL SUPPLY CO.
121-135 Social Hall Ave.
Salt Lake City
Phone: 3-6727

WASHINGTON

E. H. HOLM & COMPANY
1016 First Avenue, S.
Seattle
Phone: Kenwood 5030

Q. Why does Blanchard grind its own machine parts on a Blanchard?

A. It's the only way we know to get highest quality at lowest cost!

Shown here are 117 different parts of a #18 Blanchard Grinder. 239 surfaces on these 117 parts were ground on a Blanchard, for the simple reason that *there isn't any better way.*

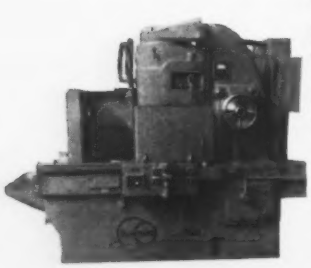
Everyone who uses Blanchard Grinders knows that Blanchard elements are machined with extreme accuracy . . . that they *have to be!*

Furthermore, Blanchard users everywhere would undoubtedly agree fully with these two actual statements recently made by customers:

"There is no greater machine tool money value than a Blanchard. It is the best buy we ever made".

"Until our Blanchard went to work, I never realized I could actually save so much, as compared to previous methods of machining flat surfaces".

If you do not own a Blanchard, we invite you to select some of your own components, and let us give you estimates to compare with your present quality control tolerances and machining costs. Chances are you'll find it will pay you to ***"PUT IT ON THE BLANCHARD".***



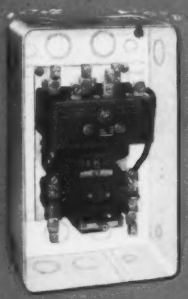
P. S. You guarantee yourself full benefit from your Blanchard Grinders when you use the correct Blanchard abrasive wheels!

Send for free copies of "Work Done on the Blanchard", (fourth edition), and "The Art of Blanchard Surface Grinding".

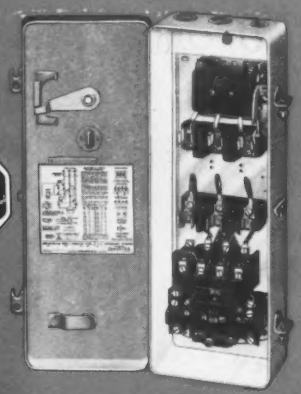
PUT IT ON THE BLANCHARD

THE BLANCHARD MACHINE COMPANY 64 STATE ST., CAMBRIDGE 39, MASS., U.S.A.

Bulletin 609 Size 0 manual across-the-line starter with START-STOP buttons and two thermal breakers that automatically stop the motor in case of sustained overload. Available in NEMA Type 1 general purpose, NEMA Type 4 waterproof, and NEMA Type 7 explosion-proof enclosures up to 5 hp, 220 v; 7½ hp, 440-550 v.



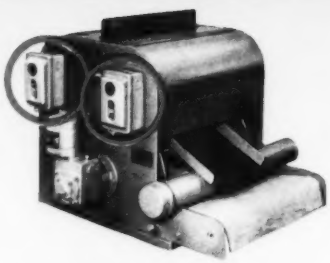
Bulletin 709 Size 3 solenoid across-the-line starter for automatic or remote control. Two thermal relays trip the switch in case of sustained overload. They are available in various NEMA type enclosures up to 300 hp, 220 v; 600 hp, 440-550 v.



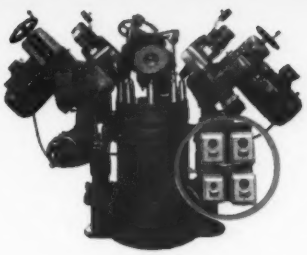
Bulletin 712 combination starter with solenoid starter and manual disconnect in one enclosure. Cover cannot be opened unless disconnect lever is in OFF position.

MANUAL AUTOMATIC COMBINATION

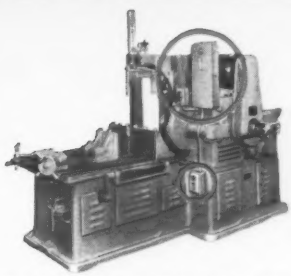
ALLEN-BRADLEY MOTOR STARTERS FOR ALL TYPES OF MACHINES



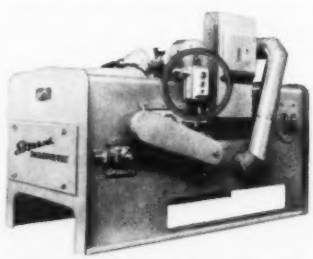
Barnesdril magnetic and fabric filter for removing contaminants from industrial coolants. Equipped with two Bulletin 609 manual starters in general purpose enclosures.



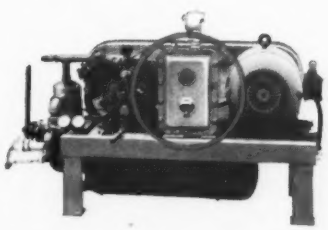
Acme type L-B-L rotary automatic buffing machine for automotive parts. Equipped with four Bulletin 709 solenoid starters with Start and Stop push buttons in starter cover.



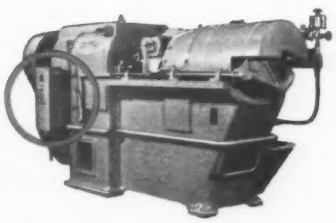
Peerless vertical heavy duty hack saw with Bulletin 712 combination starter for main motor and Bulletin 609 starter for coolant pump. Has oiltight push button station.



Stearns type AM magnetic separator for purifying powdered magnetic materials. Being a dry process, Bulletin 609 manual starter has NEMA Type 1 enclosure.



Loading pump at L.P.G. tank truck terminal equipped with Bulletin 709 solenoid starter in NEMA Type 7 enclosure for safe control in hazardous or explosive atmospheres.



New Britain multiple spindle machine. Equipped with Bulletin 712 combination starter with manual disconnect and solenoid starter in one NEMA Type 1 enclosure.

The preference of machinery builders for Allen-Bradley manual and solenoid starters is world-wide. The A-B trade-mark is recognized, everywhere, as the sign of QUALITY in machine tool control. Send for the Allen-Bradley Handy Catalog . . . a 125-page reference guide on trouble free manual and automatic control.

5-55-M

Allen-Bradley Co.
1316 S. Second St.
Milwaukee 4, Wis.

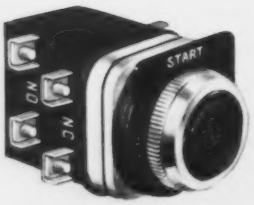
In Canada—
Allen-Bradley Canada Ltd.
Galt, Ont.

A-B Quality

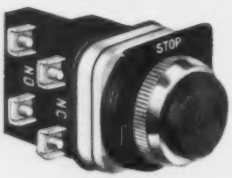
ALLEN-BRADLEY

SOLENOID STARTERS

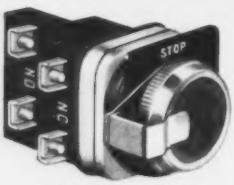
QUALITY



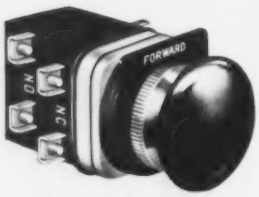
Start button



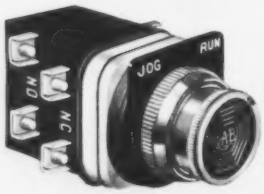
Stop button



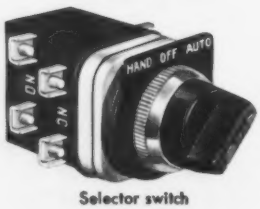
Stop button with locking attachment



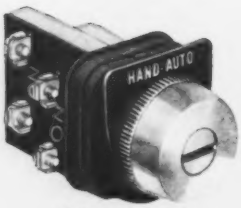
Mushroom head button



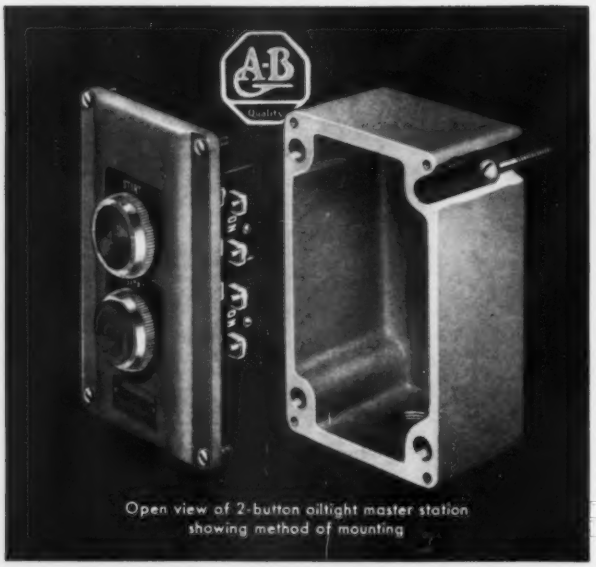
Jog button



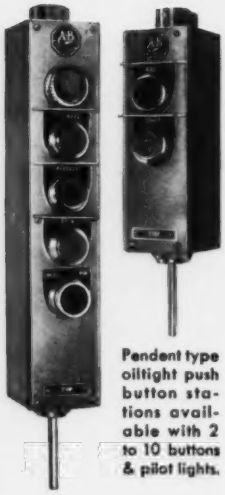
Selector switch



Coin slot selector



Open view of 2-button oiltight master station showing method of mounting

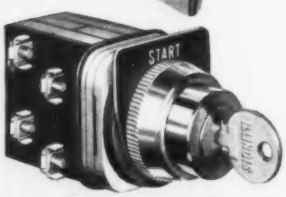


Pendent type oiltight push button stations available with 2 to 10 buttons & pilot lights.

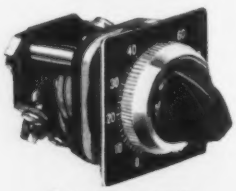
ALLEN-BRADLEY OILTIGHT PUSH BUTTON LINE

that *Satisfies Every Requirement*

Jog button with Start button and Stop & Jog lever



Cylinder lock button



Potentiometer unit

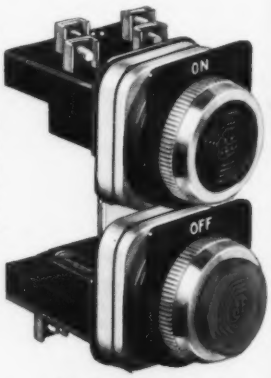
Pilot light Transformer type

Here are a few Allen-Bradley oiltight push button units for machine tools that can be used in endless combinations. All have a flexible, oiltight diaphragm between button and contact block to exclude oil or cutting fluids from contacts. The silver contacts are maintenance free.

Contact blocks may be assembled interchangeably with any type of button. They are available with 1 NO-NC; 2 NO-NC; 4 NO-NC; 2 NO; or 2 NC contacts. Pilot lights of matching design are standard items. See the A-B Handy Catalog for details.

Allen-Bradley Co., 1316 S. Second St.
Milwaukee 4, Wis.

In Canada—
Allen-Bradley Canada Ltd.
Galt, Ont.



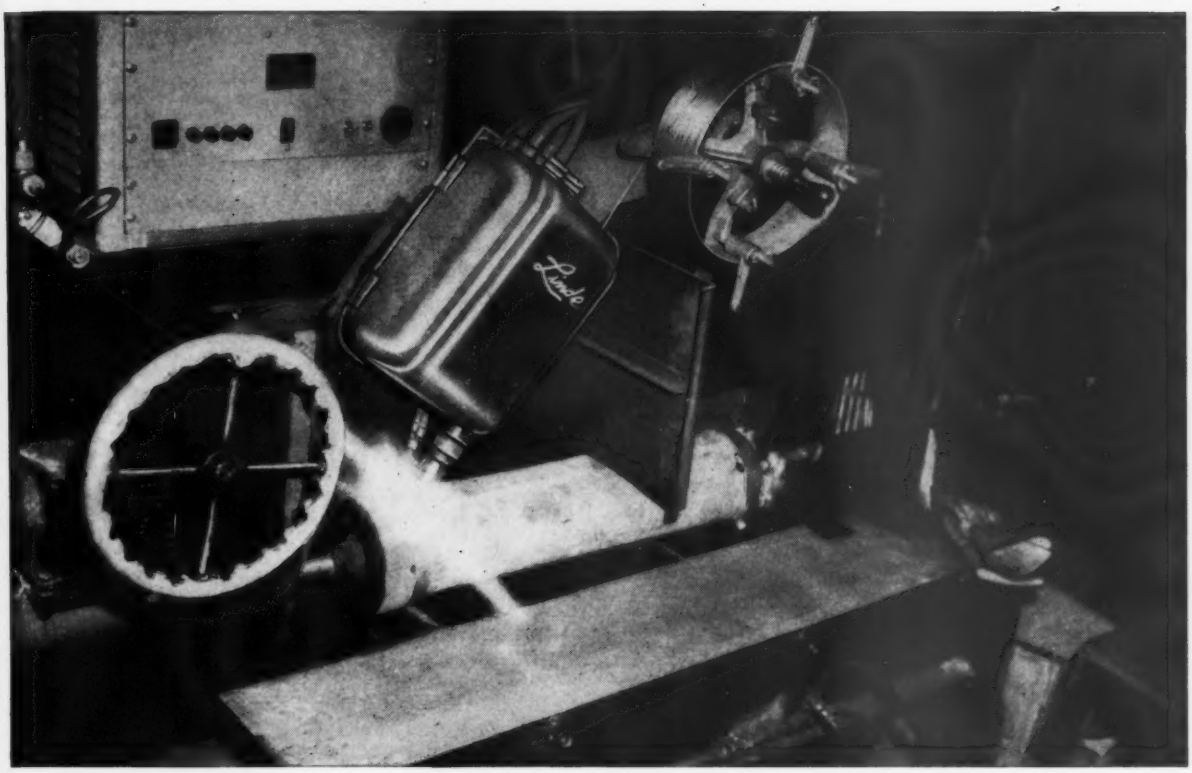
Two-button maintained contact button

5-55-BM

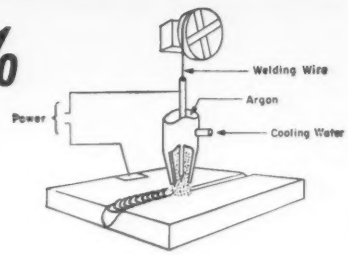
A-B Quality

ALLEN-BRADLEY QUALITY

BULLETIN 800T PUSH BUTTONS



Sigma Welding...Cuts Costs 36% Ups Steel Fabrication 93%



By shifting from manual arc welding to mechanized sigma welding, production of 31-in. long, 11-ga. steel condensers was almost doubled—costs were cut over a third—and unit quality greatly improved. These sigma welded condensers have been tested to hydrostatic pressures of 2,800 lb. per sq. in. with no sign of failure.

All completed condensers are subject to an air pressure test under water, and a supersensitive electronic leak detector . . . Rejects have been practically eliminated by sigma welding. Like many other products throughout industry, these condensers are being fabricated faster and more economically than ever before. Here are some sigma welding features—

- Uses any standard d.c. or constant potential power supply. With c.p., no control is necessary to maintain constant arc voltage, starting is faster and operations more efficient.
- Makes smooth welds in all type joints—on all commercially fabricated metals.
- Welding speeds exceed 100-in. per minute in many operations . . . And sigma welding joins metals up to ¼-in. thick in one pass. Start saving now, call your local LINDE representative for more information—and ask for Form 7942 "Modern Methods of Joining Metals."

Linde Air Products Company
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.
Offices in Other Principal Cities
In Canada: DOMINION OXYGEN COMPANY
Division of Union Carbide Canada Limited, Toronto

The term "Linde" is a registered trade-mark of Union Carbide and Carbon Corporation.

Linde Trade-Mark

2d annual
PLANT AND MAINTENANCE number

JUNE 1955

Western Industry

How big a maintenance dollar?

Some typical percentage figures from Western plants may enlighten you

WHAT per cent of the value of various well-known products or services is chargeable to maintenance?

No thoroughly satisfactory answer can be supplied without a great deal of research, for a spot check made by WESTERN INDUSTRY with a number of companies in the West reveals that maintenance cost figures in relation to sales volume are not readily available.

Obviously there are wide differences of opinion between companies and industries as to what constitutes maintenance. Nevertheless our readers will find much food for thought in the replies received.

These figures show a range from 12 to 20% in steel, lumber, and cement down to .097% in electronics, but this does not necessarily reflect comparative efficiency.

"We do not have a cost accounting system," wrote one young and prosperous company in the electronics field. "Therefore figures pertaining to unit cost, or maintenance for that matter, are not readily available. While we could undoubtedly come up with an annual over-all cost figure, we would have difficulty defining maintenance, and to dig out the figures that would give you the percentages you requested would be impossible for inclusion in your June issue.

"We would probably be surprised to learn the cost of our maintenance."

COSTS money, but worth it.

HE CAN save you shutdowns.

The questions asked by WESTERN INDUSTRY were as follows:

"How do maintenance costs in your industry compare with the value of the product? That is, what percentage of the unit cost of your product is chargeable to:

1. Preventive maintenance.
2. Actual expense.
3. Delays and deterioration of plant investment.

LITTLE things run into big.

4. Combined total of the three items above."

To take the high figures first, here is the report from a steel mill:

"I heartily agree that industry as a whole needs more information on this vital subject. Unfortunately, your deadline does not provide us with sufficient time to develop all of the data you asked for, since our normal accounting system does not automatically segregate these expenses.

"Accordingly, the only information readily available is concerned with total actual maintenance expense, which amounts to approximately 20% of the average manufacturing cost of our over-all range of finished steel products."

Dropping down a few notches in the percentage scale, a lumber company similarly reports that it is almost impossible to give the breakdown asked for, but adds:

"For the year 1954 our maintenance

having trouble getting steel?

In the face of high demand, some steel users are finding it difficult to get just what they need when they need it. If you are having trouble meeting current steel requirements we probably can help you. Here's why:

First, despite the fact that our own stocks have been hard hit in spots, we still have the world's largest inventories of carbon, alloy and stainless steel on hand—thousands of tons—and these stocks are being replenished daily.

Second, when local shortages do occur your nearby Ryerson plant can draw on stocks at fifteen other Ryerson plants and, in this way, can often take care of customers who would otherwise have to delay production or maintenance work.

Third, when the exact kind or size you need is not on hand, experienced Ryerson steel men can often supply a practical alternate from our large, diversified stocks. For example, heavy carbon steel plate, sheared into flat bars—or straight-chrome stainless to replace chrome-nickel types, etc.

And most important, you can depend on Ryerson to maintain positive control over the quality of your steel. In specifying, in handling, in cutting, first emphasis is always on quality under the Ryerson Certified Steel Plan. So whether or not you are having trouble getting steel, you will find our unequalled stocks, extensive facilities, and experienced organization are your most dependable source for help on steel problems.

RYERSON STEEL

In Stock: Carbon, Alloy and Stainless Steel; Bars, Structurals, Plates, Sheets, Tubing, etc.

JOSEPH T. RYERSON & SON, INC.

LOS ANGELES—Plant: 4310 E. Bandini Blvd. Mail: Box 3817, Los Angeles 54. Phones: ANgelus 2-6141, from San Diego, (no toll) ZEnith 6660.
SAN FRANCISCO—Plant: 65th & Hollis Sts., Emeryville. Mail: Box 188, Emeryville, California. Phones: OLympic 3-2933, ENterprise 1-0176.
SEATTLE—Plant: 1200 - 4th Ave. Mail: Box 3268, Seattle 14. Phone: SEneca 2300.
SPOKANE—Plant: North 207 Freya St. Mail: Box 2158, Spokane 10. Phone: KEystone 9311.

2d annual
PLANT AND MAINTENANCE number

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"For the year 1954 our maintenance

CHECKS at 50 and 100 hours, overhaul at 200, for Pacific Intermountain Express refrigeration units, in Denver shop.

cost, covering labor and supplies, was 16.3% of the total cost of putting our products on cars. The 16.3% was broken down into 8% for supplies and 8.3% for labor. Due to the fact that our main plant is old, our maintenance cost probably runs higher than the average in our industry."

For cement, here is what one mill has to say:

"For the year 1954 the direct maintenance cost to the five main operating accounts for the production of portland cement, namely, quarry, secondary crusher, raw mill, kilns, and finish-grinding mills, amounted to 12.8% of our total cost.

"This percentage is actual maintenance as differentiated from 'operating supplies,' which includes brick, grinding media, mill liners, crusher mantles, etc., which are not included in the above figure.

"As you can see, this is a substantial part of our production costs."

More electronics figures

To jump to the opposite end of the scale, a second electronics manufacturer (who does have cost figures) reports:

"Maintenance cost is equal to .097% of applicable sales. The following should be noted—we do not have maintenance costs broken down into the two categories mentioned; departmental maintenance such as the repair of departmental equipment is not included in the above percentage; maintenance expense is charged directly to the department and is not a separate figure.

"In our opinion, this maintenance cost would amount to something less than .01% of sales. We assume that item 3 of your letter refers to depreciation expense of buildings, equipment, trucks, and autos. If that is so, this expense is equal to 1.511% of sales."

Also paint and metals

An electric products manufacturer (who may not get such a long price as the preceding company) says:

"1. Preventive maintenance—we estimate this to approximate one-third of our total maintenance cost.

"2. Actual expense—we estimate this to cost 8% of our product cost.

"3. Delays and deterioration of plant investment—we estimate this at 20% of our total maintenance cost.

"4. Combined total of the three items above—8% of total unit cost of product."

PAINTING inside of motor bracket in water wash spray booth at Westinghouse electrical repair shop, Emeryville, Calif.

Still another firm in the precision field reports:

"Considering that question 1, 2, and 3 consist of the total maintenance costs (as stated in question 4) 5 to 6% of the unit cost of our production is chargeable to maintenance. Of this maintenance cost, about 20% is chargeable to preventive maintenance."

A paint manufacturer does not have a cost breakdown in the form requested, but offers the following:

	Percentage of unit cost	
	Paint department	Varnish department
Building maintenance		
Labor	0.11	0.07
Materials	0.03	0.04
Machinery maintenance		
Labor	0.89	0.71
Materials	0.32	0.17
Total	1.35	0.97

"Our maintenance department," says this paint company, "has a schedule of preventive maintenance which provides for most overhauling to be done in the quiet seasons. Most of the emergency repair work is accomplished on Saturday and by having replacement units, either on a rental basis or as spares, to avoid shutdowns for repair during the regular work week. In consequence, we do not have any appreciable costly delays due to machinery breakdowns."

From a second paint manufacturer, whose accounting procedures preclude any reliable figures in such short time, comes the following comment:

"My own personal experience indicates that an active preventive maintenance campaign can reduce the over-all maintenance costs by about 15 to 20% and cut in half the amount of unscheduled down-time for maintenance operations. This latter fact is often more important than the extra maintenance costs."

Says a manufacturer of metal products:

"1. Preventive maintenance cost is approximately .186% of product value.

"2. Actual expense of maintenance. This is approximately 4.91% of product value, but does not include service charges such as cost of purchasing, industrial relations, etc.

"3. Delays and deterioration of plant investment. Sorry, we cannot conveniently obtain this information from our available records."

In the rubber field, in a relatively new operation which consists primarily of hand rather than machine operations, here is a ratio of maintenance costs to factory costs only:

1. Preventive maintenance	.6%
2. Actual expense	2.0%
3. Delays and deterioration	.2%
Total	2.8%

MOTORS take a beating in steel mills. View shows motor storage in electric shop, Bethlehem Pacific, South San Francisco.

Department too small for records? Use this system

Practical method for maintenance supervisor with small crew and one office assistant

FRED S. REIBIN
Plant Engineer
Enterprise Engine Div.
General Metals Corp.
San Francisco

A REPRESENTATIVE group of plant engineers were recently asked the following question: "What do you consider as the main objectives for your maintenance department?" Answers were received from plant engineers with crews ranging from a few men to several hundred men.

These answers were boiled down to one main objective: "Keep the plant facilities in good running condition with the least expenditure of money."

This objective is the challenge which faces every plant engineer or maintenance department supervisor. Before he is able to accept this challenge, he must have certain information at his disposal. He must know how much money is being expended for repairs, how many labor hours are being used to do the work, the quantities of material used, and complete information about his equipment and buildings.

To obtain this information, good record systems must be established.

In large organizations, with plentiful office personnel and elaborate accounting systems, it is easy to have this information compiled at regular periods and placed in the hands of the plant engineer.

But what about the maintenance supervisor or plant engineer in a smaller plant, with a crew of eight to 12 men in the shop and only a clerk or another engineer in the office? What can he do to acquire adequate records which he can use to study the performance of his department?

Having been placed in this position some years back, the writer will discuss a record system which was set up with the aid of one draftsman-clerk. It was his job also to keep the records up to date, order miscellaneous material, keep track of work orders, and do miscellaneous drafting jobs in between.

It was decided that records for each subject would be kept in individual Pendaflex folders, filed numerically by machine number, building number, etc. Pendaflex folders were chosen for this purpose as they fit nicely into racks which can be easily placed in standard four drawer file cabinets. Any time one needs to refer to any particular subject all one has to do is lift the folder out of the rack and all of the information is there ready for study.

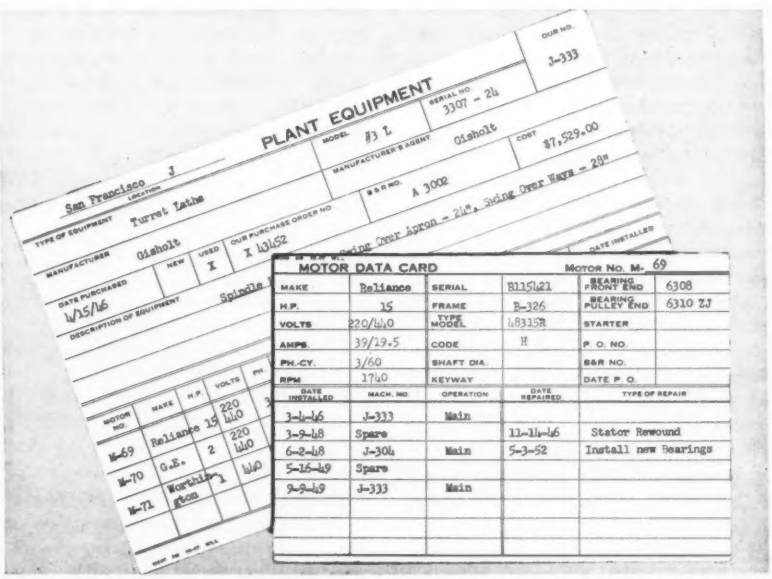
The following records were built up:

1. Individual record cards for every machine were checked for accuracy and revised wherever necessary. Where motors are associated with the equipment, the assigned motor numbers and motor name plate data were added to the cards. These cards bear the company assigned equipment number and are filed numerically for easy reference.

2. The plant layout drawing was brought up to date. This drawing shows the physical placement of the machines in the plant and their assigned machine numbers.

3. A Pendaflex folder was prepared for each machine. Each folder has a tab giving the machine number and description. The folders are arranged numerically by machine number.

In each folder is placed a log sheet bearing the description of the machine



PLANT EQUIPMENT

LOCATION	San Francisco J
TYPE OF EQUIPMENT	Turret Lathe
MANUFACTURER	Gisholt
MODEL	#3 L
SERIAL NO.	3307 - 24
OUR NO.	J-333
MANUFACTURER'S AGENT	Gisholt
COST	$7,529.00
B & B NO.	A 3002
DATE PURCHASED	4/15/46
NEW / USED	X
OUR PURCHASE ORDER NO.	X 43452
DESCRIPTION OF EQUIPMENT	Spindle Swing Over Apron - 24", Swing Over Ways - 28"

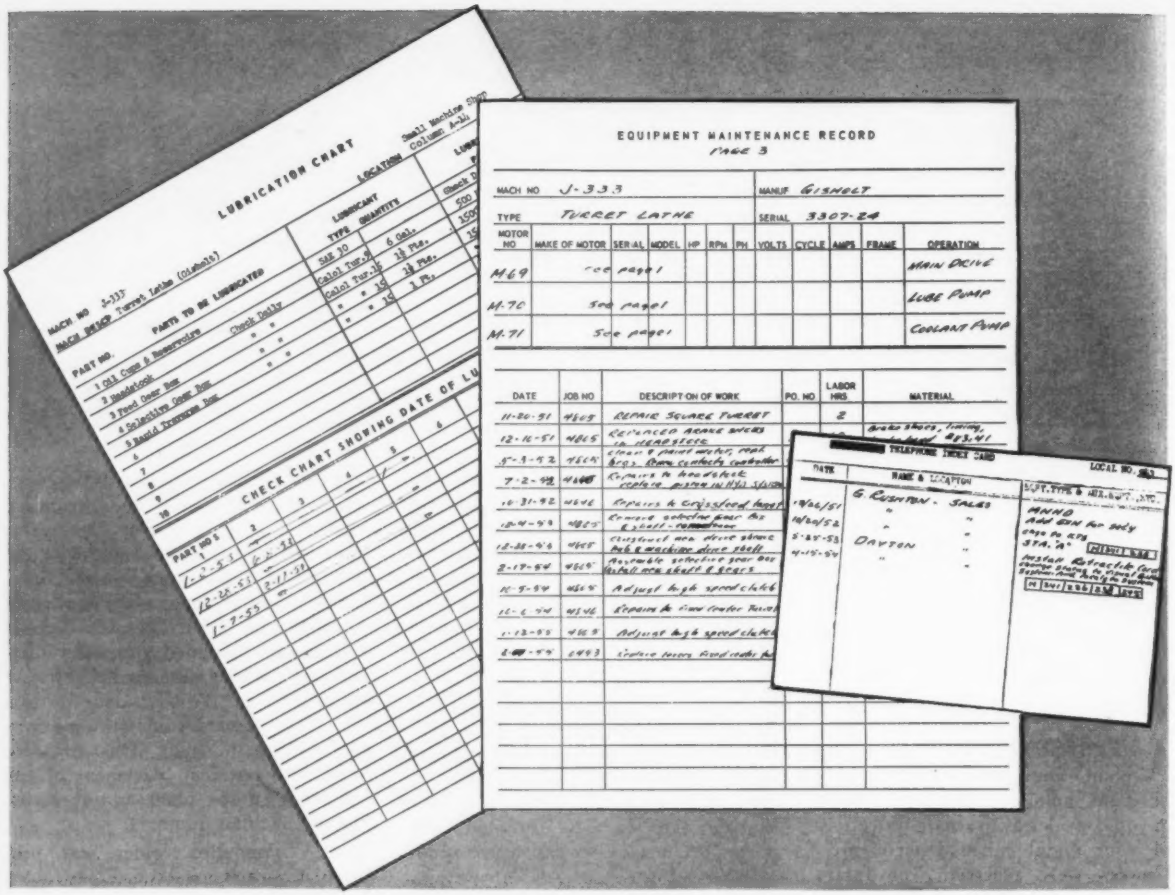
MOTOR NO.	MAKE	H.P.	VOLTS	PH.
M-69	Reliance	15	220 440	3
M-70	G.E.	2	220 440	
M-72	Northlite 1 RPM	1	440	

MOTOR DATA CARD — MOTOR NO. M- 69

MAKE	Reliance	SERIAL	B115421	BEARING FRONT END	6308
H.P.	15	FRAME	B-326	BEARING PULLEY END	6310 ZJ
VOLTS	220/440	TYPE MODEL	48315R	STARTER	
AMPS	39/19.5	CODE	H	P. O. NO.	
PH.-CY.	3/60	SHAFT DIA.		B&R NO.	
RPM	1740	KEYWAY		DATE P. O.	

DATE INSTALLED	MACH. NO.	OPERATION	DATE REPAIRED	TYPE OF REPAIR
3-4-46	J-333	Main		
3-9-48	Spare		11-14-46	Stator Rewound
6-2-48	J-304	Main	5-3-52	Install new Bearings
5-15-49	Spare			
9-9-49	J-333	Main		

INDIVIDUAL record cards for each machine (top) bear assigned equipment numbers and are filed numerically. Motor record cards (bottom) show cleaning schedule and repairs.



LUBRICATION chart for each machine (left), on which all oil changes are posted. Equipment log sheet (center) shows when work was done, what nature, manhours required, description of parts purchased, order number, and cost. Plant telephone index card (right).

at the top and ruled spaces below for posting the following information:

a. Date on which work was performed.

b. Description of the work and number of man hours.

c. Description of the parts purchases, purchase order number, and the cost of the parts.

Each folder also contains the maintenance manuals and electrical wiring diagrams. These are given to the maintenance men whenever work is done on the equipment and returned to the file when the work is completed.

In addition a manila folder is placed in the equipment file. This folder contains all completed purchase orders pertaining to the particular piece of equipment, the purchase orders being arranged numerically with the last purchase order on top.

4. A purchase requisition book was set up where all purchase requisitions are filed numerically, each requisition being assigned a "PE" (Plant Engineering) number.

A "gimmick" used with these purchase requisitions is of considerable help in identifying material when it arrives. A "Do not type" note, for our information only, is written at the bottom of each requisition which tells the purpose for which the material is intended, which machine the parts are being ordered for, the departments where it is going to be used, or the period the supplies are intended to last. When delivery of parts takes 90 to 120 days, this helps considerably in identifying and tagging the parts.

Purchase order file

5. A purchase order file was set up with purchase orders filed numerically. As soon as the material arrives, the purchase order is pulled out of the file and the "receiving report" is stapled to it. A brief description of the parts is posted to equipment log sheet and the purchase order is filed in the manila folder in the equipment file.

Note: Posting the information to the log sheet may seem to be unnecessary duplication of effort. The notes on the log sheets are necessarily brief, however, and by having the purchase order number and brief description of the parts on the log sheet, it takes only a few minutes to find the purchase order number when it is necessary to reorder the same parts.

6. A motor record card file also was established. Each motor and generator had a brass "M"-number attached to the motor or generator adjacent to the nameplate. The nameplate data was recorded. This was done by the night turn electrician. Cards were typed for each motor the following day. The assigned motor number and nameplate data was also posted to the equipment record card and the equipment log sheet.

The motor card is used to show the motor cleaning schedule and repairs. As each motor was cleaned or repaired, the bearing numbers were also posted to the motor record cards. When the first motor cleaning program was complete, it was possible to determine the sizes and types of bearings most frequently used and the number of motor bearings of each size which should be kept in stock.

7. A small equipment file was set

up in Pendaflex folders. Each drinking fountain, unit gas heater, electric hoist, etc., had an "E"-number tag attached to it. The nameplate information was recorded. Information on like pieces of "E" equipment is kept in the same folder. Each subject folder has a number assigned to it. The subjects are listed in an index which shows a cross-indexing file number. Whenever any parts are purchased for the "E" equipment, the purchase orders are placed in the appropriate subject file.

8. Pendaflex folders were also made up for each building, each department, and each office. In these folders are placed the work orders, the purchase orders, and folded layout drawings which pertain to the particular subject.

9. Pendaflex folders were also set up for various categories of general supplies, i.e. janitorial, electrical, carpenter, painter, etc. Purchase orders placed in these folders serve as a means for studying amounts of each material used, most economical quantities to buy, and the periods which a certain supply of material will last. These records are excellent for establishing an operating budget.

Fire extinguishers keyed

10. Drawings were prepared showing fire extinguisher locations, types of extinguishers at each location, and the fire extinguisher number. When a fire extinguisher is returned after refilling it is very simple to have it placed in the proper location when the number is stenciled on the fire extinguisher and also at the location where the hanger is located.

11. Sprinkler system layouts were placed in a file for easy reference when building changes are contemplated.

12. All plant engineering drawing numbers were listed in an index book showing drawing sheet size and the file drawer number where each drawing is located. Each tracing bears the file drawer number in the margin for ease of replacement in the proper file.

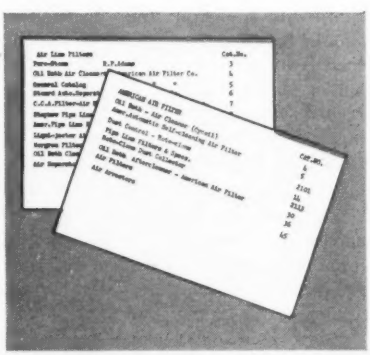
13. A card file was set up for plant telephones. Each extension number is on a separate card which shows the location of the telephone, type of instrument, any interconnection with other instruments, and name of individual to whom it is assigned. All requests for telephone changes are channeled through the plant engineering office. This eliminates confusion during installation and removals and also allows plant engineering department to plan telephone conduit runs and terminal cabinet locations during office revisions. Sizes of conduits and terminal spaces are worked out with the aid of telephone company engineers.

14. With the aid of an oil company lubrication engineer a manual was prepared for the lubrication of all major equipment. This manual contains a lubrication chart for each machine. Oil changes are scheduled for the oiler and posted to the cards when the work has been completed.

15. A door key record system was set up from a master drawing which shows every door number. Each key issued has the door number stamped on it. A signed receipt from the recipient of the key, showing the date of issue, is placed in a card file. Whenever a person leaves the employ of the company, the personnel department returns that person's key to the plant engineering department, and the receipts are pulled out of the file.

Control of the key situation was obtained by having a lock company check all tumblers and make new tumblers for all of the locks. The new tumblers have a different type of key slot so that the old keys could not even be inserted in the new locks.

16. A catalog reference file was established. First a group of numbers was assigned to each subject. Numbers 1-99 are for after-coolers, air compressors, air line filters; numbers 100-199 for arbors; numbers 200-299 for balancing machines, etc. As each catalog is received, it is assigned the next number from the proper category and is filed numerically in a Pendaflex folder which has been assigned that series of numbers. The vendor's card is attached to each catalog before it is filed.



CARD INDEX makes catalog reference easy.

A card index file is arranged in two categories by "subject" and by "manufacturer." Each "subject" card lists the description of the items in the catalog, the manufacturer's name, and the catalog number. Each "manufacturer" card lists the description of the product and the catalog number.

17. Records are also kept showing quantities of gas, electricity, and water consumed each month. The rate schedules are filed with these records for easy reference.

18. Each piece of furniture, file cabinet, and office machine has an "F"-number tag attached to it. A list was made up giving a description of each piece and its location.

It should be obvious to the reader that such a comprehensive record program is not completed overnight. It was also found by the writer that no records will grow by themselves but that each phase of the record program must be pushed vigorously, and as rapidly as time permits, and as work allows.

It is also apparent that records must be examined critically to be sure that they are useful, that they are correct, and the office personnel keep it up-to-date in every detail.

An important tool

What can these records do for you as a plant engineer or maintenance supervisor?

1. They can justify your request for purchase of new equipment. You know how many hours were spent on repairs and how much material was used. You can accurately determine hours of production lost. You can thus justify the need for replacement.

2. You can reduce breakdowns. Good lubrication pays off. Motor cleaning and repainting pays off. In the writer's case, motor failure was reduced from three failures a month on large motors to three a year at most. (Most of the latter cases are due to other causes than dirt, single phasing, faulty controllers, etc. Controllers are also serviced on a regular schedule.)

3. More useful work hours for the plant engineer. No time is wasted in obtaining information in ordering parts and materials and for making reports to management.

4. Stock control is obtained of maintenance supplies. Reordering is done by fixed periods, cutting down the number of purchase orders which are issued.

5. Budgets are made out intelligently. The size of crew can be justified by the work records, and material to be used can be estimated accurately.

A comprehensive record system such as the one described can be established and kept up with only one clerk in the office. It is an important tool in the program to accomplish that main objective, "Keep the plant facilities in good running condition with the least expenditure of money."

OLD BOARDS do not necessarily fade away; many have received proper maintenance and are still going strong. But if not, the operators are likely to take a beating.

Locate your instruments right

. . . It will make maintenance as well as operation much easier.

RULE-OF-THUMB yardsticks in industry have been replaced to a great degree by accurate measurement. Instruments for measuring, recording, and controlling are regulating many processes to insure efficiency, quality, and quantity of output.

Industrial instruments twenty years old are not uncommon—a tribute to the makers of instruments—but the everyday performance and service of instruments requires proper maintenance and servicing.

Location of the instrument or instrument panel plays an important role in the maintenance of the equipment as well as its operation. There is usually one best location for the instrument in relation to the job being done. Sometimes this requires a combination of equipment such as transmitters and receivers.

Whenever a transmitter-receiver combination is being used in connection with control, the transmitter should be located so it can be readily seen from the location of the control valve. In the case of a temperature record—no control, where the bulb is many feet away from the recorder—the saving in cost of capillary tube systems will almost pay for a transmitter.

The value of transmitters and receivers is often nullified by mounting them in groups, so positioned that they are not visible from the control valves.

By
J. C.
GROENEWEGEN
Chairman,
Maintenance
Clinic
Instrument Society
of America
(September 10-12,
Los Angeles)

Such visibility is especially important when for some reason it becomes necessary to resort to use of the by-pass.

Grouping of transmitters requires long meter lines in addition to the difficulty caused by the lack of visibility from the control point.

Installation of instruments requires consideration of future maintenance problems. Complete servicing should be possible without the use of sawhorses, staging, or crawling between pipes, over partitions, or being forced to work in impossibly close quarters between the instrument panel and the wall. A 3-ft. clearance is recommended around instruments.

Instrument service is necessary from time to time. Proper provision for it will increase the time equipment is on control and will facilitate work done during shutdowns. The interchanging of equipment can also be made more easily if all items of the

same type are connected or installed in an identical manner.

Let us assume we are about to put instrumentation to use in a plant. We have installed the instrument in a desirable location. We should make certain nothing in our instrument has shifted since it was assembled, tested, and shipped. If at all possible, check the item against a standard.

The power and air supply is on. The process is ready. First, we will use our instrument to measure only—assuming the instrument is a controller. During the measuring stage, we will do any necessary controlling through hand operation of a manual valve, or an equivalent item, in the system.

First hours important

Instrument manufacturers are always careful to keep things clean and to remove loose materials as parts of plants are assembled, but loose material is sometimes overlooked. It is during the first hours of operation that it begins to move. By using the by-pass valve during the first hour of operation, we protect the motor valves of the new equipment, and reduce the necessity for opening the valve by about 85%.

We have now been circulating material in our assumed plant for some time. We feel that most of the material that could cause trouble has been washed down the line. Next, we set the index of our control under the pen, for that is the spot that has been giving us correct results while we were on "manual" control.

We follow the manufacturer's suggestions for approximate control settings. We gradually open the block valve ahead of the control or motor valve and watch the travel of its stem. If it goes toward "closed," we start pinching off on the by-pass valve. If the travel is toward "open," we open the block valve an additional amount. Soon, the by-pass is closed and the block valve open. Anxiously, we watch the chart, wondering if the control will catch in time.

Remember to give everything a chance to settle. Keep the manufacturer's suggestions in mind while watching the chart. When a change seems in order, make the necessary adjustment and watch the results. If the resulting change seems worse than before, you are sure of the required adjustment. Change the controls once again and watch the chart through several cycles. Do they remain of the same magnitude or are they changing? If they retain the same pattern, another change in setting is in order. If the cycles are flattening, you are on the right track. If the cycles are spreading or becoming sharper, a change is probably necessary.

Give instruments clean, dry air. Keeping your air supply dry, water and oil free, and free of corrosive gases pays great dividends. Failure to keep air clean results in air and water accumulation at various points in the instruments—usually points where there is a drop in pressure.

Low pressure points in instruments are usually at the nozzle and flapper or at the relay valve. At first, such accumulation is not too serious but as the water and oil collect dirt, the trouble begins. It becomes necessary to revert to hand control while the instrument is serviced.

Maintenance tips

The servicing may consist of merely cleaning the affected parts with a solvent and then drying them, or it may be necessary to exchange the fouled parts for spare items. Such replacement parts must be pre-tested and set to fixed standards.

Many instruments have been developed to make tests of component parts. Periodic servicing of them has a great value and can be accomplished with some. Servicing of others, however, is almost an act of treason because manual control is so difficult. In these cases, it is usually a case of curing after the trouble sets in.

An alternate is to move in while a plant is down for the infrequent overhaul or major repairs and completely service the test equipment. This includes the cleaning of meter pots, calibration of the primary element, servicing and testing of the control apparatus.

The lead lines to steam meters in many plants are often plugged with lime deposits. This can be reduced by frequently blowing these lines to the atmosphere.

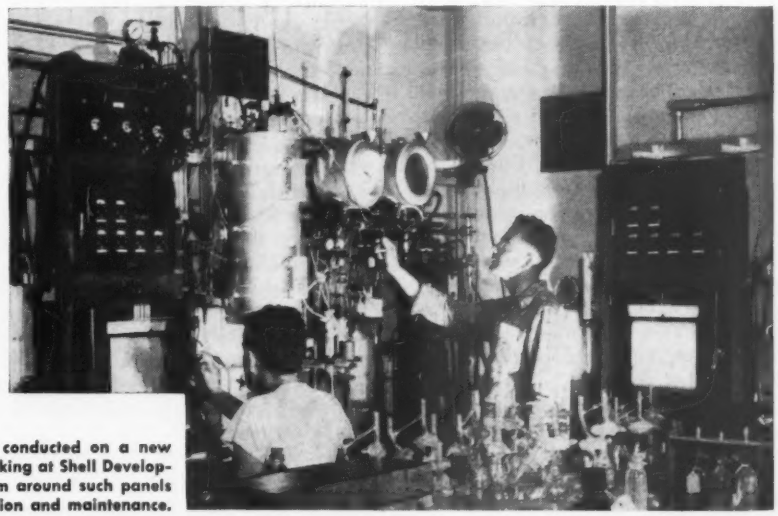
Orifice meters are used on many fluids. Most of them use a lapped shaft and bearing to transmit motion from the float to the pen or index. These require lubricants. At present there is a need for an improved lubricant for use with various types of solvents and similar compounds such as acetone and water.

In connection with the metering of light hydrocarbons remember that trouble from vapors will be encountered if sufficient pressure is not maintained on the line or the meter itself is not lower than the orifice.

Thermocouples in furnaces operating at temperatures over 1,800 deg. F. and burning oil have a very short life. To maintain uniformity of production these couples are often changed on an 11-day cycle. Their protecting tubes have a relatively short life. The cause of this is the compounds that result from burning of the oil.

In many cases, purge systems are used on orifice meters. These function very well. Only infrequently is trouble encountered, and then it is usually due to the plugging of a restriction in the purge supply line by foreign matter.

Control valves have been developed to the point where they give excellent service. Their main source of possible trouble has been the packing gland. It has often been of value to dispense with the grease ring and fitting and fill the entire gland with packing.



LABORATORY tests are conducted on a new process for catalytic cracking at Shell Development Co. Adequate room around such panels provides efficient operation and maintenance.

DISCONNECTING switch and spare feed cable at this main pole provide floodlight for after-dark maintenance work, eliminating the need for flashlights or truck spots and permitting crews to do their work with more ease.

Standby power

A Denver plant justifies the expense of a standby

ON the basis alone of its protection value against emergency, a standby power unit does not earn its keep unless and until the emergency actually occurs. But as a source of power and light for night and weekend crews doing maintenance work, it can justify its expense immediately.

Such has been the experience of Shwayder Bros., Inc., of Denver, luggage manufacturers. Although their primary purpose was the avoidance of panic and injury to any of their 2,500 employees in case of a blackout, the engine has been put to considerable use for maintenance service. Furthermore, this supplementary use guarantees that the standby engine will be kept in good running condition.

During the last two years expansion of the Denver plant, which now has 300,000 sq. ft. of floor space, has meant rewiring, new transforming capacities, changes in power distribution, etc. This work must be done at night after the manufacturing facilities are shut down.

The engine is turned on, the circuit shut off, and the repairmen have adequate light from the emergency circuit to work. They don't have to bother with extensions or portable lighting arrangements. The emergency circuits have been hooked up to put flood lights in the transformer vaults so they can be worked on easily when the main power is off.

Typical weekend use

The only machinery which operates off the standby is in the maintenance department. Here repair tools such as drill presses, grinders, etc., are wired to the standby circuits so that repair work can be completed quickly. The motors operating the large overhead doors are also hooked into the emergency circuit in order that equipment can be moved in or out, and also so employees will have a better exit from the plant should the need arise.

This set furnished light and power for two weekends of total plant shutdown for the purpose of installing a new 13.8 kv. primary supply cable. The following areas were involved:

1. Outside pole-mounted hardware and disconnecting equipment.
2. Inside installation of new potheads and feeders in an underground manhole.
3. Inside bus and connection changes on the power vault switchgear.

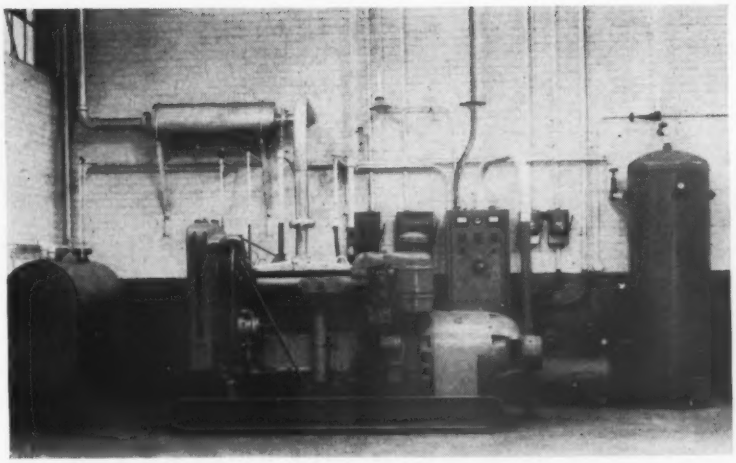
Work began early and in every case ran far into the evening. The floodlight illuminated pole switch was operated several times after dark with the assurance that you could always use both hands for operation. No need for flashlights or truck spots.

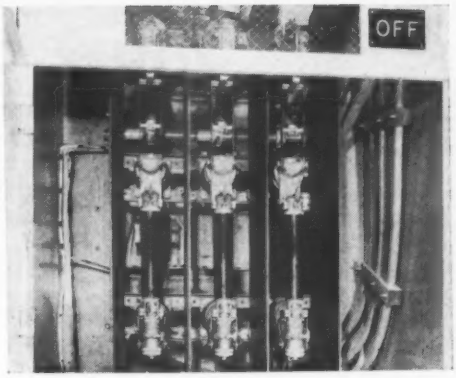
Conditions in the manhole were such that it required ventilating fans as well as illumination. The ability to provide this with a minimum of difficulty was made possible by this set. At the same time that work was progressing in these two areas, the vault bus was being changed. Again the high level of illumination provided in the vaults saved much time and effort.

Circuit difficulties, rare as they may seem, sometimes occur. With this thought in mind, the company is installing equipment for pumping important process water. The thinking here indicates that circuit transfer mechanism is justified to keep these pumps operating, since the water supply is used for cooling a large number of injection machines. An outage of the water system could cause hours of down-time in this department.

A direct circuit breaker operation may not occur on this circuit running the pumps. With this water demand

STANDBY power unit (top) at Shwayder Bros., Inc., is a Caterpillar diesel electric set. Feed connections, visible below condensing units on bottom of fuse clips (bottom), were required in area behind this primary interrupter switch.





earns its keep

power unit by using it for off-time maintenance work

covering a 24-hour operation, however, it was felt that work on the bus and maintenance might at times require this circuit to be dead when the injection machines had to operate.

In one instance it was necessary to move a power drill press into an area for drilling bus sections in place on the job during a shutdown. Again, this was accomplished by use of the emergency circuit at point in need.

Future plans indicate that the plant distribution voltage will be raised from 220 to 440 v., three phase. Since this may cover a considerable amount of weekend and graveyard shift work, it is felt the diesel electric set will be an invaluable aid.

The standby generator is a 90 kw. Caterpillar D326 diesel electric set, installed in August 1953. Special circuits were run off of this generator for the critical lights and heating facility motors which would be necessary during a power blackout. The 220 v., 3 phase generator provides the full 220 v. to the critical motors and 127 v. to the lighting circuits.

The engine was installed with a special automatic air starting device designed by Electric Equipment and Engineering Co. of Denver whereby the engine would be capable of automatically providing a full power load to the emergency circuit within five seconds after a power failure. The engine is pre-conditioned with 90-100 deg. water circulating in the cooling system.

Emergency operation

It doesn't take a complete stoppage of all electric power into the plant to turn on the engine. It is set up so that a failure on any of seven key circuits throughout the plant will automatically start the engine and provide power to all lights and motors on the emergency circuits. These seven circuits are so wired that if one of them was completely taken out by an explosion, the diesel could still provide power to the rest of the plant.

"The main purpose of these emergency circuits is the safety of the employee," points out Charles Bell, Shwayder Bros. power engineer. The special circuits are set up to provide light and heat in the plant where employees might be idled for some time by a power failure. No manufacturing machinery can be powered off the set.

Floodlights on the emergency circuits are strategically located throughout the plant in any location where employees might happen to be during a blackout—in the manufacturing area, in the medical rooms, in halls, on stairs, in rest rooms, offices, cafeteria, and outside all plant exits. This lighting circuit is only a safeguard against a failure during the shifts operating at night. The plant has adequate natural lighting during the day. However, the heating operating off the standby unit is a precaution against failures at any time of the day.

When power is cut off, whether accidentally or purposely, the lights come on immediately. However, in the boiler room circuit, the motors which power the fuel pumps and blowers have to be turned on manually by the fireman or electrician on duty.

Shwayder Bros. has three boilers in its heating plant. One operates on oil and/or sawdust and the other two burn sawdust exclusively. The sawdust, which is a byproduct of the manufacturing plant, is fed to the furnaces through blowers which are wired to operate off the emergency circuit.

In almost two years that the standby engine has been installed, there have been only three or four minor failures.

W. E. Fore
North American

C. A. Gallaher
Robertshaw-Fulton

O. W. Howard
Hughes Aircraft

J. A. Atkinson
DuPont

G. A. Evans
Axelson

B. P. LaForge
Consolidated Eng.

Western Maintenance Show and Conference

Second annual event especially tailored to meet Western needs

MAINTENANCE is better recognized in the West this year as a major industrial operating factor.

The Second Western Plant Engineering and Maintenance Conference and Show, concurrent events in Los Angeles, July 12-14, are one evidence. A second is the maintenance clinic September 10-12 that the Instrument Society of America will hold as part of its national convention and exhibit at Los Angeles.

Last year the plant engineering and maintenance events in Los Angeles were in a sense experimental, but the response was so great that repeat performance was decided on. The show will be held as before in Pan-Pacific Auditorium, where there is plenty of exhibit space all on one floor to take care of everyone. The conference will be at the Ambassador Hotel.

On display at the show will be maintenance products designed for spot inspection of fatigue cracks in operating machinery and plant facilities, mobile, automatic, power lubrication systems, complete preventive maintenance file systems, cost reducing waste disposal units, electronic data processing machines to show the maintenance engineer at the flick of a finger what needs maintenance and when, sensitive inspection equipment that tracks down unseen machinery wear with ultrasonic waves, and a myriad of cleaning and servicing products.

Topics for the conference program were selected in accordance with the response to a questionnaire sent to participants in last year's conference. Speakers and section chairmen were chosen from among names recommended by those who attended the 1954 sessions, and who consequently understand maintenance conditions and problems in the West. The talent will be entirely from the West, thus removing the objection that imported speakers are likely to talk about large-scale operations not applicable in the West.

General chairman of the conference is L. C. Morrow, consulting editor of *Factory Management and Maintenance*, who was chairman last year and also has been in charge of the increasingly successful maintenance conferences held in the East for several years. The show is under the management of Clapp & Poliak, who staged last year's Western show, the national shows, and also the packaging and materials handling shows that have been held in San Francisco and Los Angeles in postwar years.

The two-day conference will be devoted principally to sessions on "Planning and Scheduling," "Preventive Maintenance," "Principles of Maintenance Organization and Management," and "Inspection Procedures and Frequencies." The program is given here.

Take an early look at the exhibits planned for the Western Plant Maintenance Show —described on page 84.

Tuesday, July 12
9:30 a.m. to 12 noon
General session
Ambassador Hotel Theater

OPENING REMARKS
L. C. Morrow, general chairman.

ORGANIZING MAINTENANCE MANPOWER FOR EFFECTIVE SERVICE

"As We Do It in a Plant with More Than 350 Maintenance Employees (the Big Plant)," *W. E. Fore*, assistant plant engineer, North American Aviation, Inc., Los Angeles, Calif.

"As We Do It in a Plant with Fewer Than 50 Maintenance Employees (the Small Plant)," *C. A. Gallaher*, plant engineer, Aeronautical Division, Robertshaw-Fulton Controls Co., Anaheim, Calif.

1:30 p.m. to 4 p.m.
Sectional conferences (concurrent)

1. HOW TO MAKE CERTAIN PREVENTIVE MAINTENANCE WILL PAY FOR ITSELF

Chairman: *James E. Thompson*, operations research consultant, Stanford Research Institute, Stanford, Calif.

Discussion leader: *Otis W. Howard*, maintenance supervisor, Hughes Aircraft Co., Culver City, Calif.

2. LUBRICATION METHODS THAT INSURE CONTINUOUS OPERATION

Chairman: *H. M. Eversz*, plant engineer, McCulloch Motors Corporation, Los Angeles, Calif.

Discussion leader: *James Atkinson*, plant engineer, E. I. du Pont de Nemours & Co., South San Francisco, Calif.

3. MAINTENANCE TRAINING THAT PAYS ITS WAY

Chairman: *E. M. Goodbar*, super-

C. C. Carmine, Tide Water Assoc. | J. T. Snedden, Norris-Thermador | G. J. Puckett, Dow Chemical | F. C. Rogers, A. O. Smith Co. | J. D. Schulz, Union Oil | R. E. Clauser, Union Oil | Charles Kimball, Ford Motor

intendent of maintenance, Columbia-Geneva Div., U. S. Steel Corp., Pittsburg, Calif.

Discussion leader: *George A. Evans*, mechanical engineer, Axelson Manufacturing Co., Los Angeles, Calif.

4. HOW WE MAKE BUDGETS AND CONTROL MAINTENANCE COSTS

Chairman: *A. C. Prendergast*, Editor, WESTERN INDUSTRY, San Francisco, Calif.

Discussion leader: *B. P. LaForge*, superintendent, buildings and equipment, Consolidated Engineering Corp., Pasadena, Calif.

Wednesday, July 13
9:30 a.m. to 12 noon
General session
Ambassador Hotel Theater

MAINTENANCE PLANNING AND SCHEDULING FOR EFFICIENT OPERATION

Chairman: *L. C. Morrow.*

"As We Do It in a Plant with 350 Maintenance Employees (the Big Plant)," *C. C. Carmine*, superintendent, maintenance and construction, Avon Refinery, Tide Water Associated Oil Co., Associated, Calif.

"As We Do It in a Plant with 50 Maintenance Employees (the Small Plant)," *J. T. Snedden*, chief plant engineer, Norris-Thermador Corporation, Los Angeles, Calif.

1:30 p.m. to 4 p.m.
Sectional conferences (concurrent)

5. PREVENTING AND COUNTERACTING CORROSION

Chairman: *James M. Weeks*, plant engineer, Plomb Tool Co., Los Angeles, Calif.

Discussion leader: *George J. Puckett*, materials engineer, Dow Chemical Company, Pittsburg, Calif.

6. HANDLING NEW CONSTRUCTION AND MAINTENANCE BUILDINGS

Chairman: *Charles R. Schubert*, general manager, Kwikset Powdered Metal Products, Anaheim, Calif.

Discussion leader: *F. C. Rogers*, plant engineer, A. O. Smith Co., Los Angeles, Calif.

7. HANDLING NEW PROJECTS ON TIME AND AT THE RIGHT COST

Chairman: *R. E. Wills*, plant engineer, Pabst Brewing Co., Los Angeles, Calif.

Discussion leader: *John D. Schulz*, superintendent of engineering, Union Oil Co. of Calif., Wilmington, Calif.

8. MAINTAINING ELECTRICAL EQUIPMENT

Chairman: *J. J. Singleton*, mechanical supervisor, Lever Brothers Co., Los Angeles, Calif.

Discussion leader: *R. E. Clauser*, electrical foreman, Los Angeles Refinery, Union Oil Co. of Calif., Wilmington, Calif., and *Charles Kimball*, chief electrician, Ford Motor Co., Long Beach.

LIST OF EXHIBITORS AT THE PLANT MAINTENANCE SHOW

Exhibitor	Booth
A	
Aero-Coupling Corp.	425
Albina Engine and Machine Works	501
American Building Maintenance Co.	636
American Pamcor, Inc.	220
B	
Band-It Co.	426
The Bassick Co.	420, 422
Best Maintenance Supply Co.	527, 531
Bogart Co.	604
Breuer Electric Manufacturing Co.	540
Roy Bruemmer Enterprises	637
Buck Manufacturing Co.	324
A. M. Byers Co.	408
C	
Clark, Cutler and McDermott	620
Commercial Filters Corp.	618
Colson Equipment & Supply Co.	534
D	
Nicholas A. D'Arcy, Jr.	320
Degen-Fiege Co.	508, 510
Detroit Steel Products Co.	120
Dickson Safety Products Co.	301
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VERTICAL spacers prevent hoop deterioration caused by contact with corrosive liquid content.

"Do's" and "Don'ts" for wood tanks

By WILLIAM R. FISHER
Pacific Wood Tank Corp.
San Francisco

IN ORDER to have a minimum amount of maintenance work on wood tanks, proper care should be given to the original installation.

Wood tanks, like any other structure, are no better than their foundation. Inasmuch as the weight of the tank and its contents has to be taken on the bottom of the tank, the foundation should be laid out in such a manner that the bottom of the staves are raised sufficiently from the floor level to allow for proper ventilation under the tank.

Selection of the proper wood to be used for each particular installation should be checked with the tank manufacturer or with the National Wood Tank Institute. Their experience will give the purchaser the information he needs for a good installation.

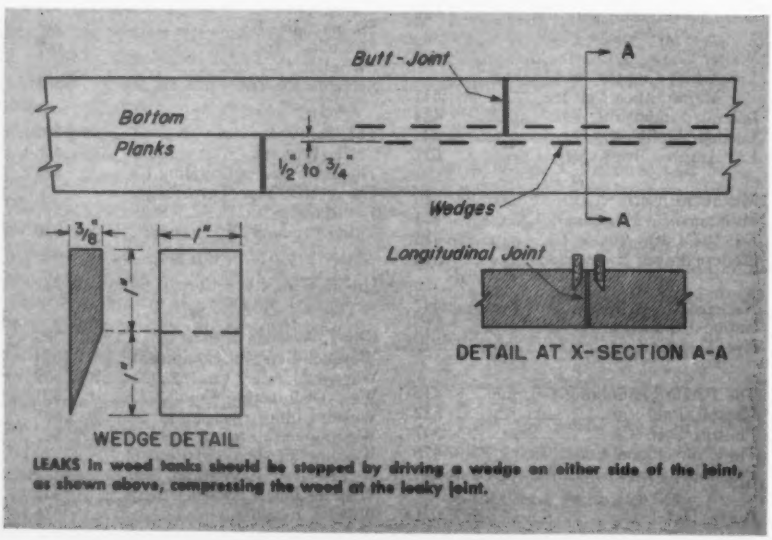
A wood tank installation, properly cared for, will give years and years of satisfactory service. Here are a few hints on what and what not to do in maintaining a tank:

DO

1. Keep the tank full of water or other solution at all times.
2. Check the hoops for corrosion if a corrosive liquid is in the tank. If there is danger of hoops being attacked, wood strips should be used between staves and hoops.
3. Keep the foundation dry; if this is impossible, be sure that there is plenty of ventilation under the tank.
4. Keep the tank foundation clear of debris.

DON'T

1. Don't caulk a leaky joint in the tank. This will only aggravate the situation. A leaky joint should be "laced;" that is, drive wedges on either side of the joint. This will compress the wood at the leak and stop it.
2. Don't paint the inside of a tank when the tank is to be used for water or some such non-corrosive solution.
3. Don't tighten hoops excessively. This will tend to crush the softened fibres of the wood and the tank will assume an "hour glass" shape.
4. Don't fill the tank above a leak between the staves. Allow sufficient time for the wood to swell at that point before raising the liquid level. The increased pressure from the weight of the liquid prevents the proper expansion to stop the leak.

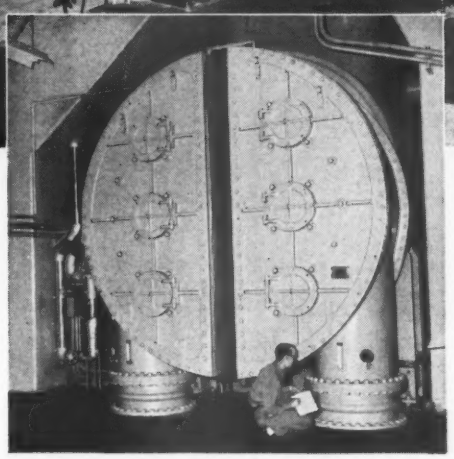


LEAKS in wood tanks should be stopped by driving a wedge on either side of the joint, as shown above, compressing the wood at the leaky joint.

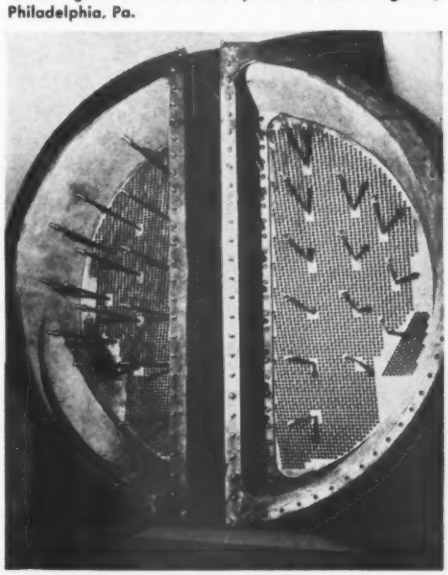
A. W. HIGGINS PLANT of the Florida Power Corporation on Tampa Bay.

REVERE 10% CUPRO-NICKEL SOLVES CORROSION PROBLEM FOR FLORIDA POWER CORPORATION

About six years ago the Florida Power Corporation was experiencing condenser tube failure at its Bayboro plant in St. Petersburg. Revere's Technical Advisory Service was called in, and recommended replacing the failed tubes with 10% Cupro-Nickel, which has a marked resistance to corrosion from brackish water. This recommendation proved successful. As a result, when Florida Power planned to add a new 135,000 KW plant, named after A. W. Higgins, Revere 10% Cupro-Nickel tubes were specified. All three units in the new plant are thus tubed. The tubes are 7/8" OD x 18 BWG, 24' 7" long. A few spares are kept on hand for possible replacement, but with regular cleaning to remove debris (small bits of shell, etc.), the tube life has been exceptional, thus adding to economy of operation and increased service to a fast-growing area. . . . If you have questions regarding condenser tube selection and service, get in touch with the nearest Revere Sales Office. Remember to specify Revere.



Exterior view of one of the condensers in the Higgins plant, and below, one of the three condensers ready for tubing. Condensers made by C. H. Wheeler Mfg. Co., Philadelphia, Pa.



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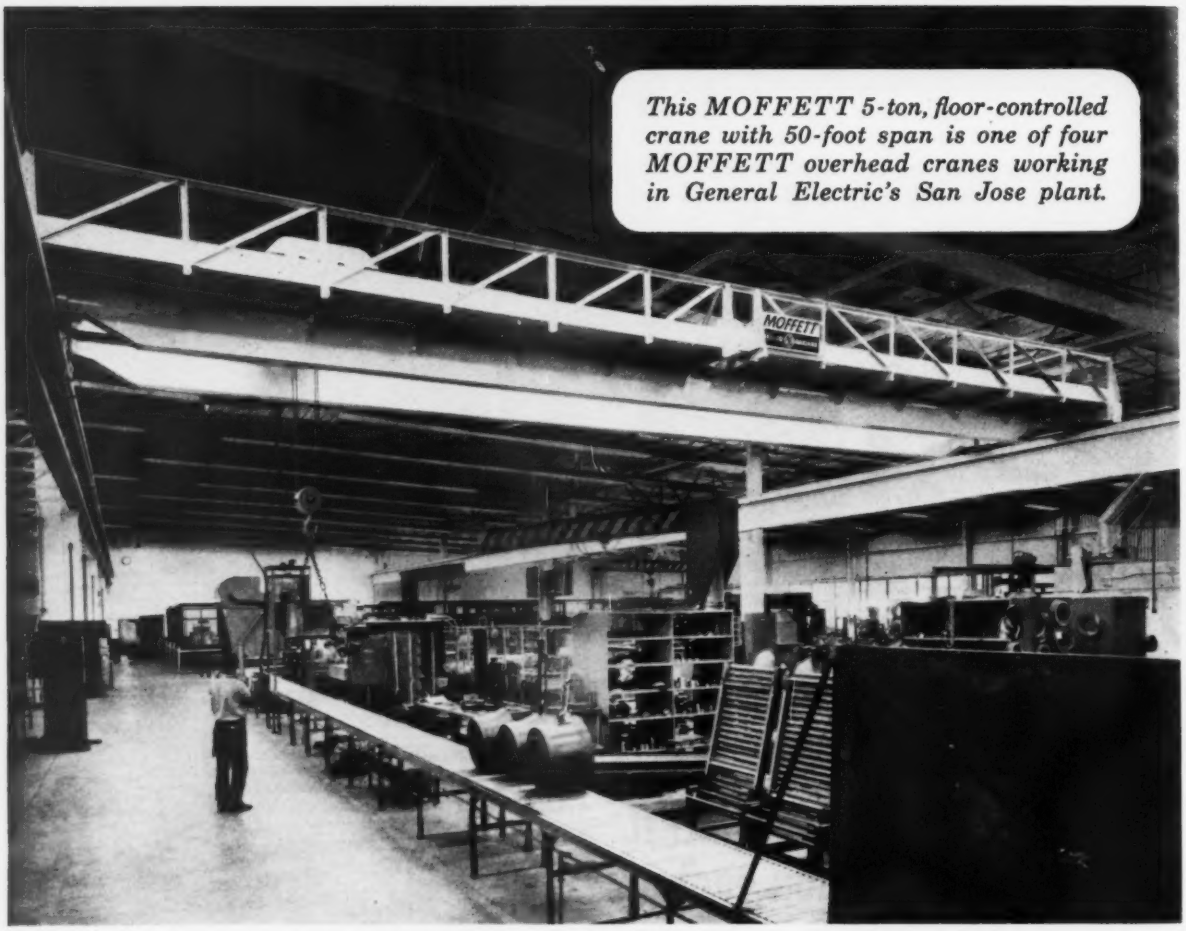

This MOFFETT 5-ton, floor-controlled crane with 50-foot span is one of four MOFFETT overhead cranes working in General Electric's San Jose plant.

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MOFFETT engineers are old hands at designing special features into cranes to improve their productivity. In most cases, you get fast, personal service because you work directly with the engineers designing your crane, thus avoid red tape and foul-ups.

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WATER:
The universal raw material

Product	Gallons required for manufacture, per ton of product
Alcohol (per ton of grain used)	20,000
Ammonium sulphate	200,000
Gun powder	200,000
Beet sugar	20,000 to 25,000
Meat packing	20,000 to 50,000[1]
Rayon	10,000[2]
Crude oil	50,000 to 100,000[3]

1. For every 100 animals processed.
2. Per 100 pounds.
3. Per 100 barrels refined.

(Average figures, varying widely from plant to plant, but significant of the tremendous part water plays in industrial development, particularly in the West.)

Controlling corrosion in cooling systems

Scientific treatment of the water will reduce damage

By
T. J.
DEVEREUX
District Engineer
W. H. & L. D. Betz
San Francisco

WITH the rapid growth of industry in the West, more attention is being paid all the time to the necessity of conserving one of its basic "raw materials," namely, water. In fact, water is recognized as the universal raw material for a great portion of industry, as the accompanying table indicates.

One of the methods for conserving water which has been adopted very widely is the use of the cooling tower to permit the recirculation of water in a cooling system rather than using great quantities of water in a once-through fashion.

While corrosion is of course an important consideration in once-through cooling water systems, it is more pronounced in general in the recirculating cooling water system, for two most important reasons.

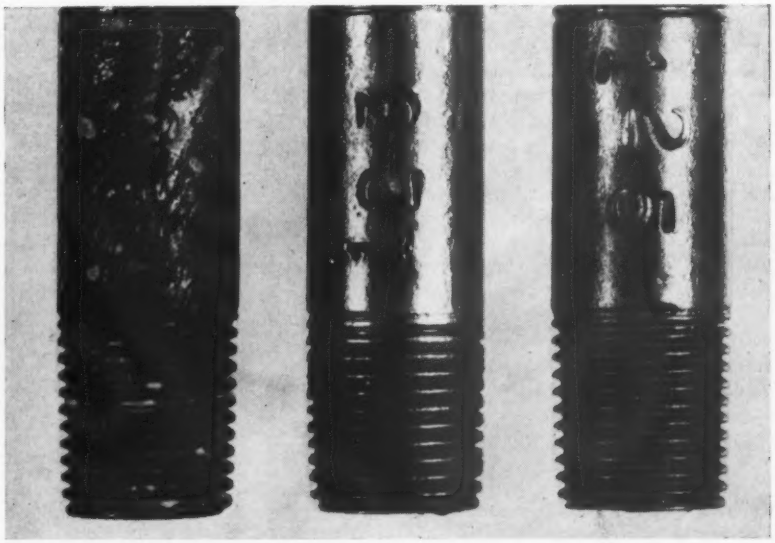
First of all, water which is passed over a cooling tower is continually aerated so that it is always saturated with dissolved oxygen which of course is the primary factor affecting corrosion in any cooling water system. The effect of oxygen concentration on corrosion at different temperatures is shown in one of the accompanying charts.

The second reason why recirculating cooling water systems are more susceptible to high corrosion rates is that the water in passing over the cooling tower is cooled by evaporation, causing the total dissolved solids content of the water to increase and proportionately increasing its conductivity. As corrosion is an electro-chemical action, the reaction rates involved will be somewhat proportional to the conductivity of the water in use.

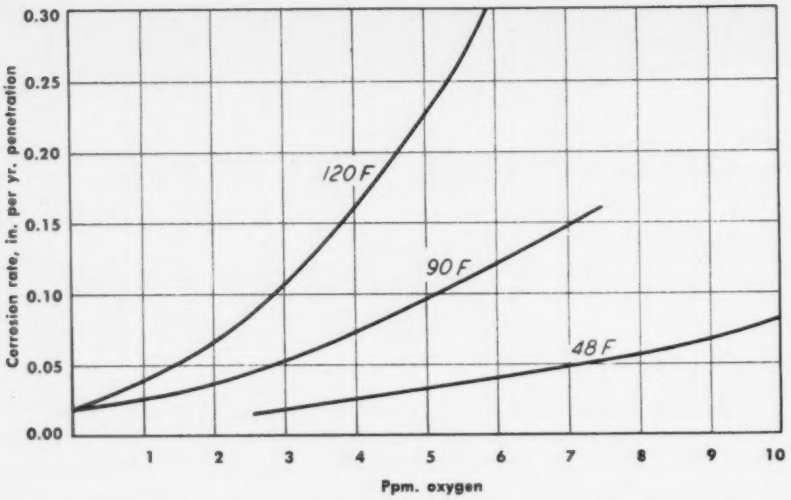
Other factors tending to increase the corrosion rate in recirculating systems are turbidity in the water due to dust which may blow into the cooling tower, corrosion cells set up throughout the system as a result of the growth of micro organisms, and the deposition of fibrous materials from the cooling tower on some of the heat exchange surfaces, setting up corrosion cells.

Several methods for combating this condition have been used, with varying degrees of success. One of the oldest is based upon the observation that in portions of the system where calcium carbonate scale is formed, an appreciable degree of protection against corrosion will result. As the deposition of such a scale is in itself detrimental to a cooling water system, the only possible approach towards utilizing this theory lies in controlling the chemical balances of the water so that only a minimum amount of scale will be formed.

This generally proves impossible because the deposition of calcium carbonate scale is affected by the temperature of the system. In a cooling system temperatures vary from point to point, so that if ideal conditions could be maintained at one point they would certainly not exist at a point of higher



TUBERCULATION of these threads shows the difference of water treatment results. Left to right, they were subjected to these treatment methods: phosphate, chromate, and Dianodic.



COOLING SYSTEM temperatures vary from point to point. The above chart illustrates the effect of oxygen concentration on corrosion at different temperatures.

or lower temperature. Consequently this method never achieves any considerable degree of success in recirculating cooling water systems.

Use of silicates

A somewhat similar approach involves the use of silicates. Actually these were used to a much greater extent in once-through systems than in recirculating systems, and silicates do reduce — to some extent — difficulties with "red water" in certain types of domestic systems.

Considering the long period of time that silicates have been employed, there is surprisingly little quantitative data in the technical literature concerning their corrosion inhibition properties in water systems.

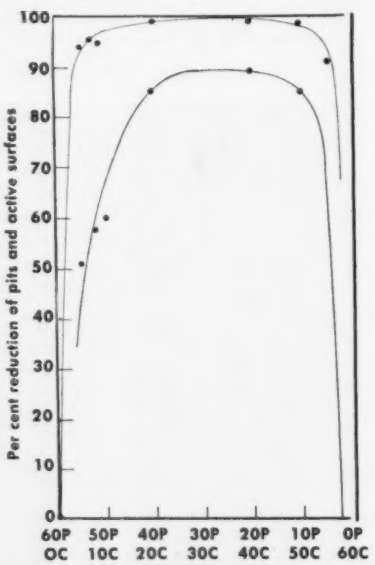
The degree of protection, however, provided by the silicates in recirculating systems has been found to be greatly inferior to that provided by other materials, in research work done by the Betz Laboratories in Philadelphia.

On the other hand, polyphosphates are widely used in cooling water treatment, both in once-through and recirculating systems. These materials possess a quality of permitting a certain degree of super-saturation without resulting in deposition.

This quality is not confined to calcium-carbonate as discussed previously, but also extends to iron oxide. Consequently, when corrosion is taking place in the system, the presence of polyphosphates in the water allows the products of corrosion to be washed away, rather than accumulating and starting local corrosion cells. In this manner the polyphosphates are especially effective in eliminating tuberculation and consequently deep pitting.

This is the primary advantage of the use of polyphosphates for corrosion control. Many theories have been proposed to explain further protection from corrosion due to the presence of polyphosphates, but it has been the experience of W. H. & L. D. Betz that the main advantage resulting from the use of phosphates in corrosion control is their ability to solubilize iron oxide particles, thus leaving a clean surface relatively free of corrosion products.

From the standpoint of saving metal by providing a high percentage of corrosion protection, the various chromate salts are the most effective corrosion inhibitors in use. With adequate chromate concentrations, corrosion rate can be reduced more than 95% in comparison with an untreated condition, which is substantially higher than can be secured by any other chemical inhibitor.



THIS CHART shows the per cent of pit reduction obtained through various mixtures of phosphate and chromate. Curve beginning at lower left is based on 60 ppm. phosphate; curve beginning at lower right is based on 60 ppm. chromate.

Low chromate concentrations, however, exhibit a difficulty that reduces their effectiveness when used alone for prevention of corrosion. Some isolated pitting of the metal usually occurs and the small amount of corrosive attack which does develop is localized in the form of pitting.

This effect results in a certain degree of tuberculation from the corrosion products, but when coupled with the use of polyphosphates, as described above, the problem is eliminated. Consequently, this combination of polyphosphates and chromates provides an excellent method for overall corrosion control. This is the basis of the Dianodic method of corrosion control.

Both the polyphosphates and chromates are known as anodic inhibitors. The use of these two anodic inhibitors simultaneously was therefore termed the Dianodic method.

Dianodic method tested

When used in conjunction with each other under controlled pH conditions and in certain definite ratios of phosphate to chromate values, the results experienced under the Dianodic method exceed that which would be expected from using phosphates or chromates independently. The effect of phosphate-chromate ratios in the Dianodic method is indicated in one of the accompanying illustrations.

For example, a comparison run under plant conditions shows the following results: The low range polyphosphate treatment with a total phosphate content of 4 to 8 ppm. gave a maximum penetration value of 0.66 in. per year. The use of chromates in the range of 200 ppm. as sodium chromate reduced the severity of pitting to a maximum penetration value of 0.15 in. per year. The Dianodic method in the range of 60 ppm. phosphate plus chromate reduced the maximum pit depth to 0.02 in. per year.

Average penetration under the low phosphate treatment was 0.021 in. per year, while under the conventional chromate treatment this value was reduced to 0.0033 in. per year. Under the Dianodic treatment the average penetration was reduced still further to 0.0020 in. per year. Thus it is evident that the use of the two materials together under controlled conditions of treatment level and pH gave far better results than would otherwise be

possible. The accompanying photograph is a vivid comparison of the three methods.

This discussion is of course extremely general, and is not intended to be a solution to the corrosion problem of any particular plant. There are many factors which must be considered before recommending any control program for minimizing corrosion in any specific cooling water system.

Conditions often exaggerated

A corrosion condition may be seriously exaggerated in any particular plant as a result of efforts to control an altogether different problem. An example of this is a large oil refinery in the Rocky Mountain region which was experiencing considerable trouble with slime and algae growths. To control this, a chlorination system was put in effect and for some reason chlorine was fed at a relatively high rate in a continuous fashion. Sufficient chlorine was fed so that the pH of the system was in the vicinity of 6.5 and frequently lower.

This plant was using a polyphosphate material for inhibition of corrosion and noted serious dezincification of their Admiralty cooling surfaces, thus leading them to believe that the phosphate system was not as effective against corrosion as they had presumed. While it is quite true that the use of a positive corrosion inhibitor such as a chromate salt would have been highly desirable, the first step in eliminating this problem was correcting the plant's method of controlling bacteriological growth.

In another oil refinery in a neighboring state, the degree of protection realized from the use of chromates in conjunction with polyphosphates was quite satisfactory, but not as good as results obtained in the same vicinity under approximately the same general methods of treatment.

Remedies vary

Further investigation revealed a considerable quantity of manganese in their raw water supply, which is particularly troublesome where corrosion is a problem. In the case of this plant the approach was an engineering study to determine whether the use of a separate water supply or the installation of equipment to remove the manganese would be economically feasible.

Consequently, it can be seen that no stock remedies are available for a particular corrosion problem. Each case must be analyzed independently to determine the cause of corrosion and the remedy needed.

Consultant services

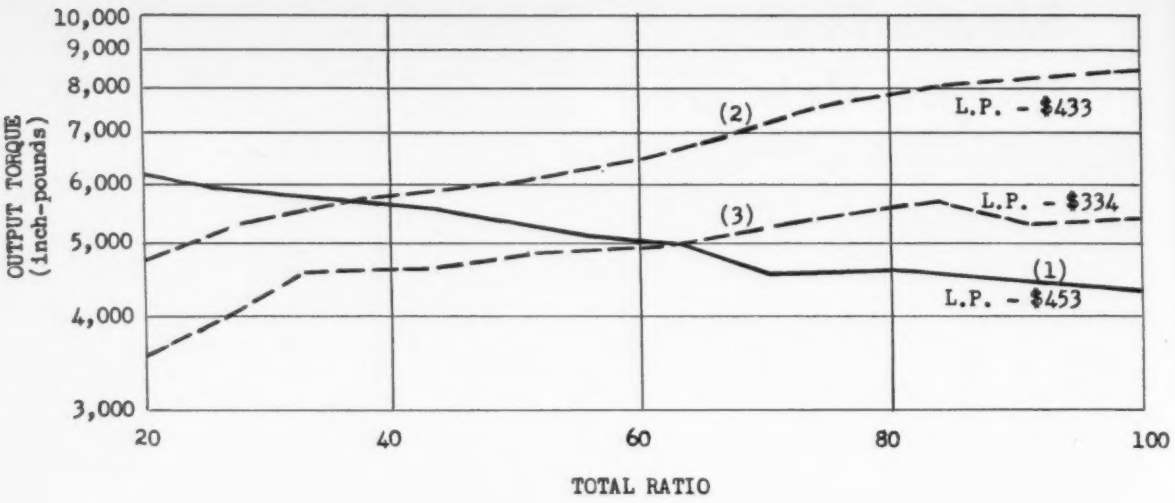
As every plant engineer knows, the problems arising in one plant will not be the same as the problems in another and any maintenance program for a cooling water system, while based on certain definite scientific principles, must be adapted to the needs and conditions of that particular plant.

For this reason, and in order to obtain the benefit of all the scientific knowledge available on the subject, the services of a reputable water consultant should always be obtained to evaluate the problems and recommend proper methods for their correction.

It is especially important that the consultant selected be able to visit the plant periodically and to review with the plant the control procedures in effect and the methods the plant is using to accomplish this control. A program of adequate follow-up service on the part of the consultant is absolutely necessary in order that the desired results be achieved.

The match test dramatizes an idea—same match and same heat can burn the hand or simply warm it. Just as your welding torch or arc welder can, in combination with Eutectic "Low Temperature Welding Alloys," join metals without risk of dangerous overheating, distortion, warping and embrittlement. Write for free booklet "How To Overcome Your Welding Problems." (TIS 2268) Eutectic Welding Alloys Corporation, 40-40 172nd Street, Flushing 58, N. Y.

Simple Test Proves New Idea



Selecting worm reducers for maximum economy

By IRWIN KOENIG
Consulting Engineer
Los Angeles

SINGLE reduction worm reducers are commercially offered with reduction ratios ranging up to 100:1. Most of the same companies offering these units for sale, also offer a double reduction unit consisting of a primary stage of helical gearing and a secondary stage of worm gearing.

These latter units have ratios starting at approximately 20:1 and extending upward beyond 100:1. These two types of worm reducers have, therefore, an extensive overlapping range of ratios.

It is a common assumption to feel that the single reduction unit is the more economical purchase, but a close scrutiny of the relative performance discloses some astonishing information.

The above drawing shows the output capacity of a commercial single reduction worm reducer with a 6-in. worm center as cataloged over a ratio range extending from 20:1 to 100:1 (Curve 1). This reducer carries a list price of $453.

Curve 2 shows the output capacity of a double reduction, helical-worm reducer built with a 5¼-in. worm center as plotted over the same ratio range. This reducer sells for a list price of $433. Note that at a ratio of approximately 38:1 the curves cross and from that ratio on, the smaller, lower cost double reduction reducer shows a higher capacity.

Curve 3 shows the output capacity of a still smaller double reduction, helical-worm reducer. This unit is built with a 4⅝-in. worm center and carries a list price of $334; yet, over a good portion of the ratio range, it will handle a greater load than the 6-in. worm center single reduction reducer.

Helical gearing helps

The ability of the smaller units to sustain higher loads is a direct result of the inherent poor efficiency characteristics of high ratio worm reductions. By utilizing a primary stage of helical gearing, it becomes possible to select a worm reduction ratio that will result in an improved efficency higher capacity, and a lower first cost.

BAY AREA location of the Blake Bros. Co. presents unusual outdoor maintenance problems.

PREVENTIVE COATING stops corrosion from fog

SEVERE WEATHER conditions caused deterioration of outdoor facilities at the Blake Bros. Co. quarry operation near San Pablo, Calif. Surfaces previously being corroded by fog and high winds—which drove rock particles and sand against the building and equipment—have recently been given a protective coating of Rust-Oleum. Outdoor maintenance requirements vary with location of plants.

"...so that others may profit with T5X."

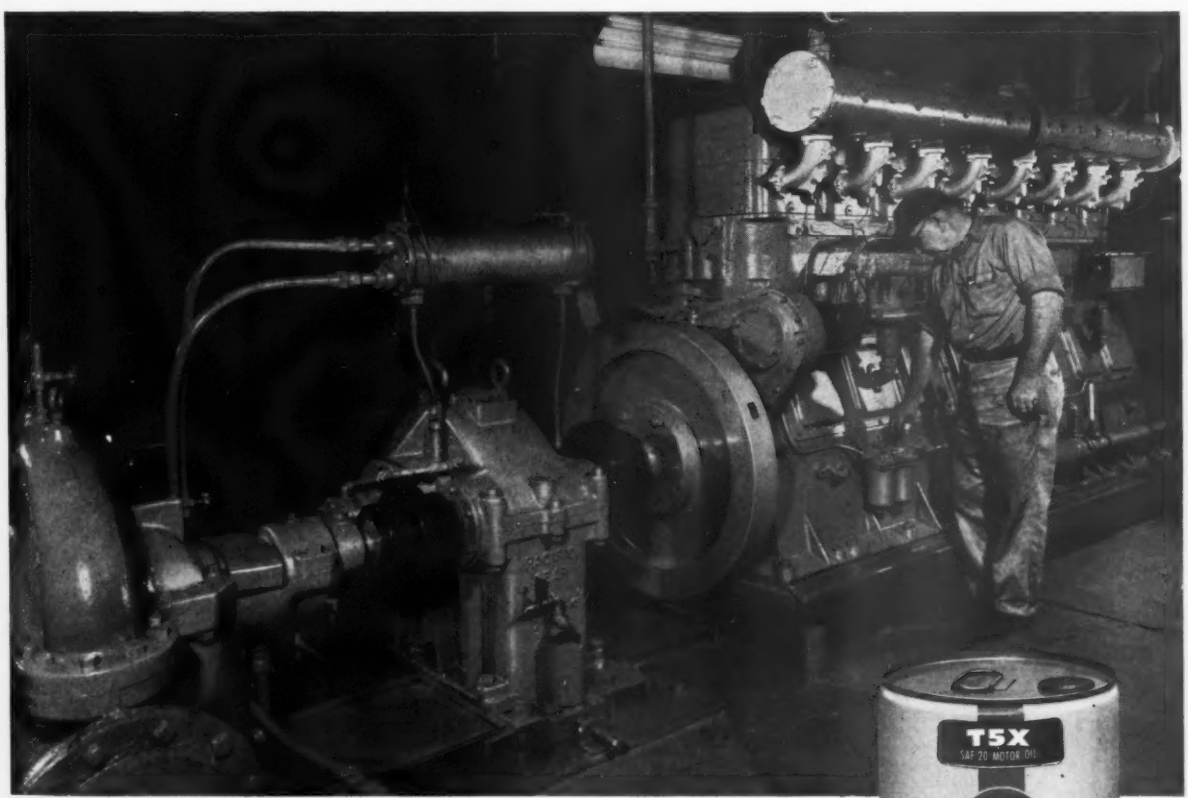
M. E. Ford, Jr., superintendent, Yorba Linda Water Co., Yorba Linda, California.

"For the past 8 years we've used Union's T5X motor oil exclusively in this 250 hp 8-cylinder Atlas Imperial diesel, converted to use natural gas. It powers a 10-inch centrifugal pump with a rated capacity of 4,000 gallons per minute.

"This engine with its present total of 43,579 hours of operation shows a maximum liner wear of only .007". No liners or bearings have been replaced, although we did re-ring at about 29,000 hours.

"We believe our finding is positive indication of the dependability and other fine qualities of this oil. We pass this information along so that others may profit by our experience with T5X."

Stationary plant superintendents, like Mr. Ford, who've once used T5X usually have unusual stories to tell about the performance they get from engines with this amazing purple oil in the sumps. Order T5X next time your engine needs an oil change... you'll get prompt delivery from your nearby Union Oil representative.



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SANITATION CLINICS held in the West

HOW TO CUT cleaning costs was discussed at sanitation clinics presented during April 1955 in Denver, Salt Lake City, Spokane, Seattle, Portland, San Francisco, Los Angeles, San Diego, Phoenix, and Tucson by Industrial Sanitation Counselors of Louisville, Ky.

Mohe H. Solworth, president of the sanitation counseling firm, directed the clinics and spoke to record attendances of persons involved in maintenance and sanitation in the West.

The program consisted of films, slides, and lectures explaining work standards required, methods of determining cleaning work loads, tools to be used, cleaning methods, scheduling of work, and cost control sanitation departments. Many forms for surveying cleaning requirements to establish a sanitation system and for scheduling cleaning work were introduced.

Mr. Solworth maintains that the vast sums of money spent in industry for cleaning can be reduced and more effective cleaning can be obtained through close study of cleaning areas, methods, and tools.

CARBON TET danger stressed

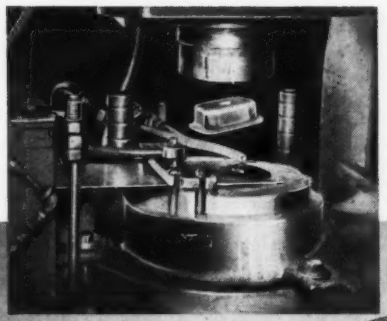
CALIFORNIA State Division of Industrial Safety is stepping up its educational campaign on the hazards of carbon tetrachloride. At least 20 California workers were killed by carbon tet in the past few years and 200 disabled by it, states their report.

Authorities report that a concentration of more than one part of carbon tet in 40,000 parts of air is dangerous. This is the maximum allowable concentration now allowed by safety orders.

Safety orders also include provisions requiring that all carbon tet containers be labeled "Danger" with a warning that includes the statement that carbon tet is hazardous vapor and liquid and that it may be fatal if inhaled or swallowed.

Most carbon tet injuries are caused by breathing the vapors, which can produce severe and even fatal damage to the kidneys and liver.

A sense of smell warning is not adequate in the case of carbon tet, for when the familiar sweet odor is detected, its concentration is at least three times as much as the safe limit.



This 80-ton punch press makes the first medium draw in producing electrical outlet boxes; turns out approximately 12,000 units per day.

Whether or not you make electrical outlet boxes—

You can save money with the one right steel!

Using 14-gauge, hot-rolled coils from United States Steel, Bowers Manufacturing Company, Los Angeles, produces a wide variety of electrical outlet boxes. The photo above shows five steps in the fabrication of a box. After the initial draw, trim, and re-draw, the knockouts are formed and clamps and screws are installed. Finally, the outlet box receives an electro-galvanized plating. Using the one right steel enables this company to get more efficient production, fewer rejects, and results in money saved.

For every job, there is one particular steel that best suits the need. Evaluating your requirements and translating them into steel is our business. Isn't there some place in your plant where the one right steel could be saving you money today? One call to a Columbia-Geneva Technical Field Representative could be the answer to your problems.

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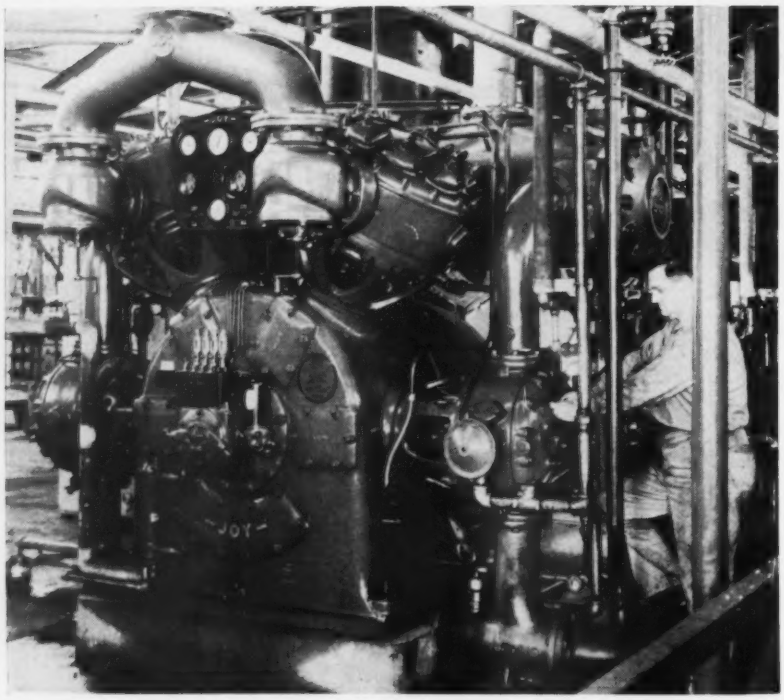

MAINTENANCE needs of large compressors are determined through the installation of gages.

Don't forget your AIR POWER PLANT

AIR COMPRESSORS, a mere convenience in the past have become the central power plant for operating many kinds of equipment. Preventive maintenance methods, routine lubrication, proper location, and selection of the right compressor to do a given job are important factors in economical plant operation.

Quickly and accurately determining mechanical problems and failures before they became acute and cause complete failure—as they sometimes do, before scheduled overhauls—eliminates costly down-time. Such maintenance requires scheduling, instruments, and trained personnel.

Automatic compressors

A periodic check on the small automatic compressor's performance as compared to manufacturer's specifications and performance data on the same unit when new is an excellent inexpensive guide to maintenance requirements of the unit. This quick check can be accomplished by closing the line valve, discharging all of the air from the tank, and then checking the time required to refill the tank as compared to the time required to perform the same operation at the time the machine was new. Troubles such as worn links or leaking valves can be determined by this means.

Another point of interest is that a worn compressor (one putting out less than 100% air capacity) does not necessarily mean that the electric bill will be proportionately higher. Electric motors only register the current required to turn the motor; thus a compressor with no rings, building no air, would require very little power. Preventive maintenance for these small units might well include selection, location, electrical hook-up, and installation. These units are frequently added to existing facilities. Many plants with planned air requirements will add an automatic compressor for the sprinkler system, put one or more small units in remote locations, or use one to obtain higher than normal pressures.

Use of more air tools, etc., after the installation of the compressor often leads the user to believe that the compressor is failing to perform as required. Sometimes, the installation of an additional compressor, or one adequate to supply the needed air, restores the first compressor to its intended performance characteristics.

Auxiliary compressors are often located outside of the plant or in out-of-the-way places in the plant. In such cases, steps should be taken to combat the "out of sight, out of mind" attitude. Compressors should always be located where the coolest possible air is drawn into the unit. Heat, created through the actual compression of the air molecules, provides one of the largest problems in proper compressor functioning.

Larger compressors and engines

Compressors producing higher horsepower (more air storage) and those operating full time require a more intense maintenance program. Trained personnel using the correct instruments are the only answer to preventive maintenance and adequate trouble-shooting in these cases.

The following instruments, used properly, present an accurate picture of the compressor's operation and indicate problems before they cause complete shutdowns:

1. *Engine indicator (recording card type).* Readings may be readily taken at any location and existing pressures permanently recorded in their true pattern, providing the frequency is not too rapid for the capability of the indicator.

2. *Pressure indicator.* A good mechanic can accurately interpret a great deal from readings on such indicators showing the average or near unusual peak pressures.

3. *Pyrometers.* Although this instrument may not always pinpoint an undesirable condition, with thermocouples near each exhaust port it affords the quickest means of ascertaining the fact that something is amiss.

4. *Scavenging air pressure gage or manometer.* A mercury-filled manom-

Roy Rosebrook

One of the country's leading manufacturers of hydraulic tracing controls, True-Trace Corp., of El Monte, Calif., has found that Gargoyle Velocite S is the *only* fluid which assures its equipment maximum stability under widely varying operational conditions.

True-Trace president Roy Rosebrook says, "most of our equipment is manufactured to operate at tolerances of .001 inch or better, so use of the proper hydraulic fluid is vital – G.P.'s Velocite S is the one we've come to rely on."

Your plant, too, can enjoy the added benefits that come with General Petroleum's lube engineering program. Call your nearest G.P. office today for the tops in product and service.

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eter appears preferable because scavenging air pressures are low, accurate readings are necessary, and accurate gage maintenance is both difficult and expensive due to vulnerability to pulsation and vibration.

5. *Intake manifold vacuum indicators.*

6. *Portable combustion vacuum indicators.* This instrument is of value only when checking 4-cycle engines.

7. *Thermometer wells or temperature indicators.* Provision for use of this instrument can least expensively be made during construction of the compressor and engine.

8. *Neon glow bulb.* This inexpensive item is useful for quick checking of relative voltage and milliamperage being transmitted through individual wires of non-metallic shielded high-tension ignition system.

9. *Neon timing lights.* This instrument can be used in daylight. Once the flywheel is properly marked by stamping, the firing time on one or all cylinders can be readily checked.

10. *Water manometer on air intake systems.* Installation of a short water manometer at the time of the compressor installation provides a ready and quickly noticed indicator of any deviation from ideal pressure.

11. *Stethoscopes.* Some mechanics report excellent results obtained from home-made stethoscopes comprised of a probe attached to a discarded earphone. More complex and delicate instruments are offered for sale. If an unnatural sound can be heard sufficiently well for analysis and/or location by means of its isolation or depression of surrounding noise nevel, an experienced mechanic can often save much down-time and expense.

Maintenance schedules and methods provided by compressor manufacturers should be closely followed in all cases. Trouble-shooting on their own product has indicated the best maintenance conditions.

Centrifugal compressors

Centrifugal type compressors, used for increasing flow of air and gases and not for compressed air storage, often handle materials which leave a carbon deposit on internal parts. Impellers should always be kept carbon-free.

Injection of water through taps in the compressor casing directed to spray on impeller surfaces keeps them free of carbon deposits. Such water injection also serves to reduce heat and therefore horsepower required.

NEW TORCH CUTTER produces multiple units

MULTIPLE flame cutting units are guided by an electronic tracing unit and template.

THE INSTALLATION of automatic multiple torch burning equipment at U. S. Steel Supply division of U. S. Steel Corp. in San Francisco provides flame cutting of units in multiple quantities.

The new torch, operated by an electronic tracing unit, can cut shapes up to 12 ft. wide and 42 ft. in length from plates up to 10 in. thick with smooth and accurate edges which usually require no further processing.

The follower device, using a phototube system, will automatically follow the intersection of any light and dark colored surface. The template needs only to provide a white outline on a dark background or vice versa, thus greatly reducing the cost of template preparation.

NEW CEMENT nailable as wood

DOUGLAS fir bark is the ingredient of an oxychloride cement composition called Plastinail — a Weyerhaeuser Timber Co. product—which makes it as nailable as wood. The new cement is being used to renovate worn-out box car floors by Union Pacific railroad.

Application involves covering the rough, splintery floor with black felt building paper and tacking it down with a layer of wire mesh. Then Plastinail is poured and troweled smooth. Union Pacific reports that after six years of use, the cars with the cement composition floors show practically no wear at all.

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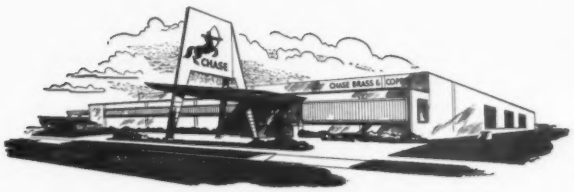

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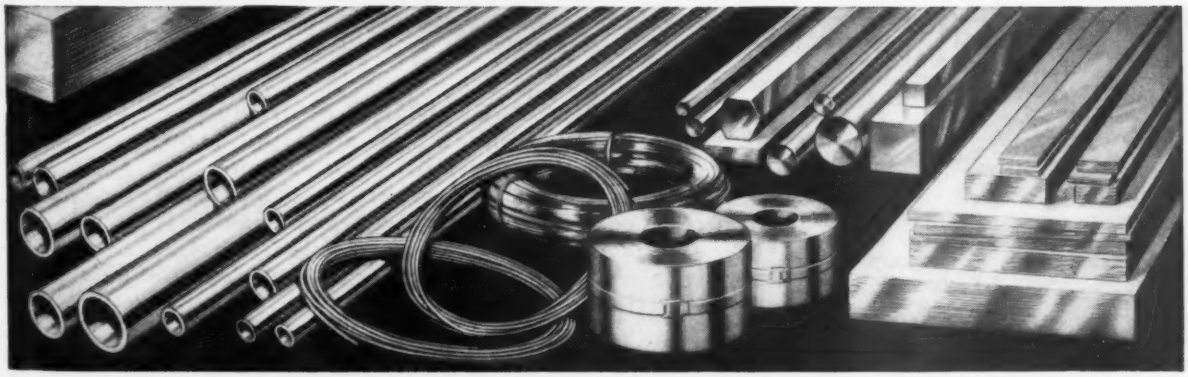

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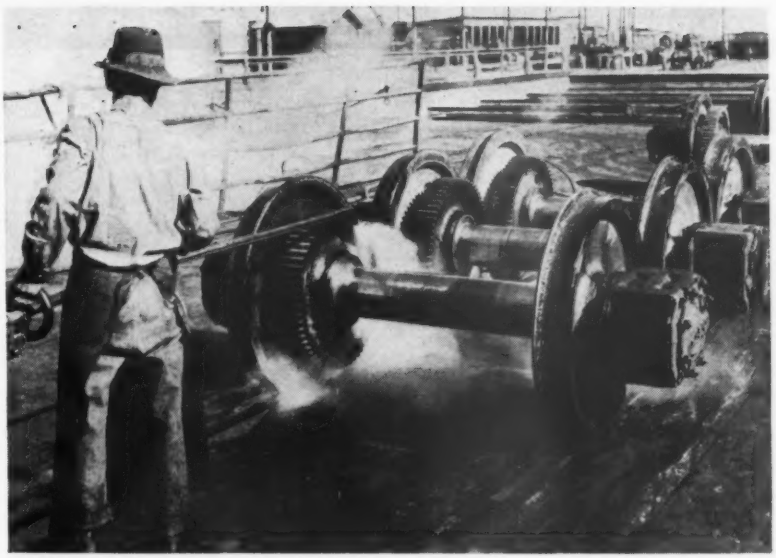
CLEANING solution is mixed with steam and blasted from this gun for cleaning otherwise inaccessible areas of gears and large equipment.



CLEANING JOBS: how to do them right

By C. S. RANKIN
Manager
North Pacific Coast Division
Oakite Products, Inc.
San Francisco

CLEANING (or related operations, like descaling) is always the cornerstone of maintenance. It should be the first step in the preventive maintenance program.

A clean machine is easier to operate, easier to inspect, easier to repair, needs repair less often, and is a safe machine. It is not only the mark of a good workman; it sets the standard for the plant.

Your cleaning crew must be impressed with the importance of their job in its relation to the entire plant, should not be considered second-class workers, and should be thoroughly briefed in their duties, down to the smallest details.

Cleaning may sometimes be ineffective because too little cleaning compound is used, or the temperature too low and the time of cleaning too short.

Rinsing must be thorough, to remove the loosened soils. Drying, or the displacement of moisture by a special protective oil, is important if rust is to be prevented.

Disposal of solutions must be in accordance with local regulations, if any have been established; and care must be taken in the disposal of wiping rags which may be saturated with flammable solvents.

Distinction should be made between the uses of different materials. Grease will yield to alkaline or solvent detergents but will not give in to acidic solutions, and scale must be removed by acidic materials.

Materials to use

To get the most from your cleaning dollar, it is a good idea to have your operation surveyed by the representative of an industrial cleaning materials manufacturer. He has the experience to tell whether you have the facilities to clean properly, whether you should set up a hot tank for cleaning, or a cold tank, or should clean by hand.

He can make suggestions for improving or adapting your present facilities, give you drawings from which you can construct your own equipment, or recommend equipment that he has seen working effectively in other similar installations.

Cleaning materials are generally divided into three classes — alkaline, acidic, and solvent.

Alkaline detergents have perhaps the greatest range of all in their cleaning abilities and uses. Mild compounds are used for such purposes as washing windows, light fixtures, goggles, masks, respirators, hoods, and cafeteria equipment, where cleaning is frequent, soils not too heavy, and the operator's hands come in contact with the solution.

More powerful alkaline solutions are used for Benzol scrubbers, floors, unit heaters, rubber belting, steam meters, lube oil and jacket water heaters, machining oil supply tanks and lines, air conditioning water systems, filters, evaporative condensers, and gas burners and oil burner nozzles.

Some of the same compounds, when used in heavier concentrations, do an excellent job stripping paint from equipment like transformers, varnish from armature coils, etc.

One alkaline detergent, for instance, is used in a plant for floor cleaning and for cleaning the Precipitron unit in their air conditioning system. At four ounces to the gallon of water it is sprayed on the baffles through a garden spray unit, allowed to soak for 30 minutes, and then rinsed off with a pressure hose. This has been done continuously for 13 years, with uniform success.

A steel mill uses a heavy-duty al-

kaline detergent to clean air compressors in the power house, at eight ounces to the gallon of water, heated with the steam coil, and pumped through the air side of the compressors to remove the oils and dirt that build up there. A California steel mill found that a scientifically compounded detergent did a better job on their oil- and rolling compound-covered floors than caustic.

A California valve manufacturer uses a heavy-duty alkaline detergent in a hot tank to remove excess aluminum die cast metal and oil from dies, taking about 30 minutes. The cleaned dies are rinsed with a pressure spray, then dipped in a special protective oil which displaces the moisture, even in the interior pockets. Formerly, using a chisel and hammer, it was common to spend as much as 16 hours to clean each die with a solvent and scrapers.

A machine company uses a mild alkaline compound to remove baked-on sulphur-based cutting oil from machinery. The cleaner is wiped on, allowed to stand for one to two minutes, then wiped off with a damp cloth. Results are excellent.

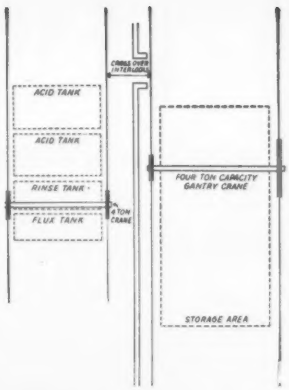
Another plant uses a heavy-duty alkaline solution to clean press dies which have accumulated a thick deposit of drawing compounds, oils, mill scale, metal chips, etc. They place the dies in a basket, lower them into the solution, let soak for about 16 minutes. Then they rinse in hot water, air dry, and dip the dies in protective oil before putting them into storage.

Still another firm uses an alkaline detergent in a pressure spray washing machine to clean dies. Three minutes through the machine, and the dies come out thoroughly clean.

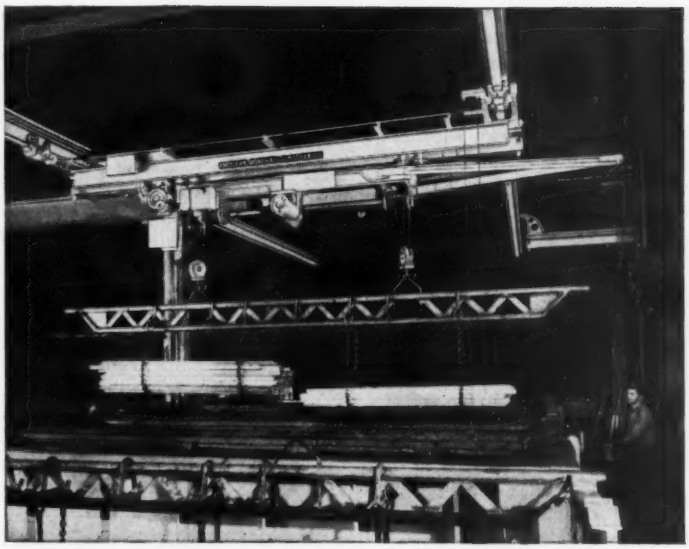
New alkaline material

One of the most remarkable innovations is an alkaline material that will remove rust, oil, grease, and certain types of paint, all at the same time. It can be used hot or cold, with or without cyanide, and with or without current. Its virtue, of course, lies in the fact that it requires only one tank and one soak; it eliminates expensive and comparatively dangerous acids; and it saves considerable time and effort.

A large aircraft corporation has found, through actual cost analysis, that the use of an alkaline detergent solution in a two-stage washer has saved $3,000 per year in the washing of tote boxes, both wood and metal. Their formula is one ounce per gallon, at a temperature of 180 deg. F. They



AMERICAN MONORAIL GANTRY CRANE SYSTEM *speeds galvanizing!*



Steel fence posts travel from fabrication to galvanizing over a gantry bridge which interlocks at a crossover track through doorway for passage to the MonoRail crane serving the tanks in the plating room.

All travel on the 4-ton system is motor operated and controlled by push-button station in the operator's hand.

Here is truly team-work handling that results in cost savings as well as increased tonnage through the galvanizing process. It is a typical example of American MonoRail engineering available at no obligation for the solution of your handling problems.

Send for Bulletin C-1 illustrating hundreds of successful Mono-Rail installations.

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formerly used a solvent emulsion cleaner.

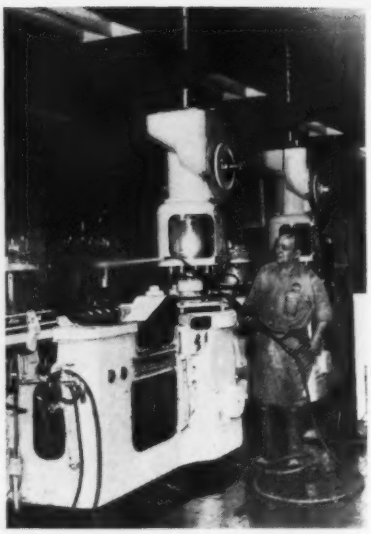
This last case points up the fact that the proper use of cleaning materials is often the difference between success and failure. The alkaline detergent was a better choice for the washing machine, but it is quite possible that a solvent cleaner would have been a better choice in another application.

This is specially so with the recent development of solvent detergents, which combine solvent action with surface active properties. They are used for a variety of purposes—from spraying motors clean to stripping certain types of synthetic finishes. Generally, they are valuable when cleaning must be done without heat. Some have extra versatility, being miscible with either water or petroleum distillate. Such water solutions are, of course, nonflammable.

One of these materials, mixed with water, has replaced carbon tetrachloride in one plant as a die cleaner. Solution is simply brushed on, then wiped off. There is no fire hazard, and the solution is non-toxic. The same material, mixed this time with kerosene, is used in another plant to remove carbon from aluminum pistons and piston rings.

A foundry uses a solvent detergent to clean core dryers. They mix it 1 to 1 with kerosene, place the core dryers in the solution, soak overnight, rinse in kerosene, and blow down with air.

The latest addition to this group of cleaning materials is a solvent detergent which combines excellent penetrating properties with a slow rate of evaporation, and has a flash point of 234 deg. F. (Cleveland Open Cup).



STEAM CLEANING was found to be the fastest means of cleaning oil and grease covered conveyors, unloaders, bottle washers, carbonators, and other machines at a major bottling firm.

It is specially useful for cleaning electric motors and other equipment where water cannot be used. It is simply brushed or sprayed on, or used in a soak tank. After cleaning, solvent and soils are simply blown off with compressed air.

The material, a liquid, is nonflammable at room temperature. It has been used successfully in a Utah steel mill to remove baked-on grease from an iron ore conveyor in the sintering plant. Hot alkaline solutions and other solvents had been tried but had failed. This new material did the job in half an hour.

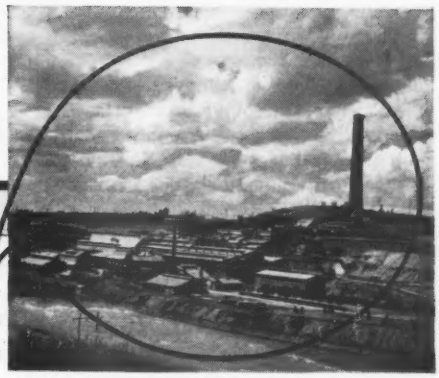
Another recently introduced solvent detergent was designed specifically for the removal of paint from vertical or inverted surfaces. It is a viscous liquid, and it is applied in the same manner as paint. After a short soak, a pressure water rinse floats away the disintegrated pigment, the loosened binder, and the solvent. Because it is viscous, it stays where it is applied, and its paint removing ability is concentrated on the surface.

The solvent detergents are also useful in precleaning operations, where heavy grease or carbon is encountered. Usually the part or machine is immersed in the solution or swabbed down by hand, and allowed to soak for a short time. Then an alkaline detergent is applied through a steam gun, blasting the previously loosened soil off the surface.

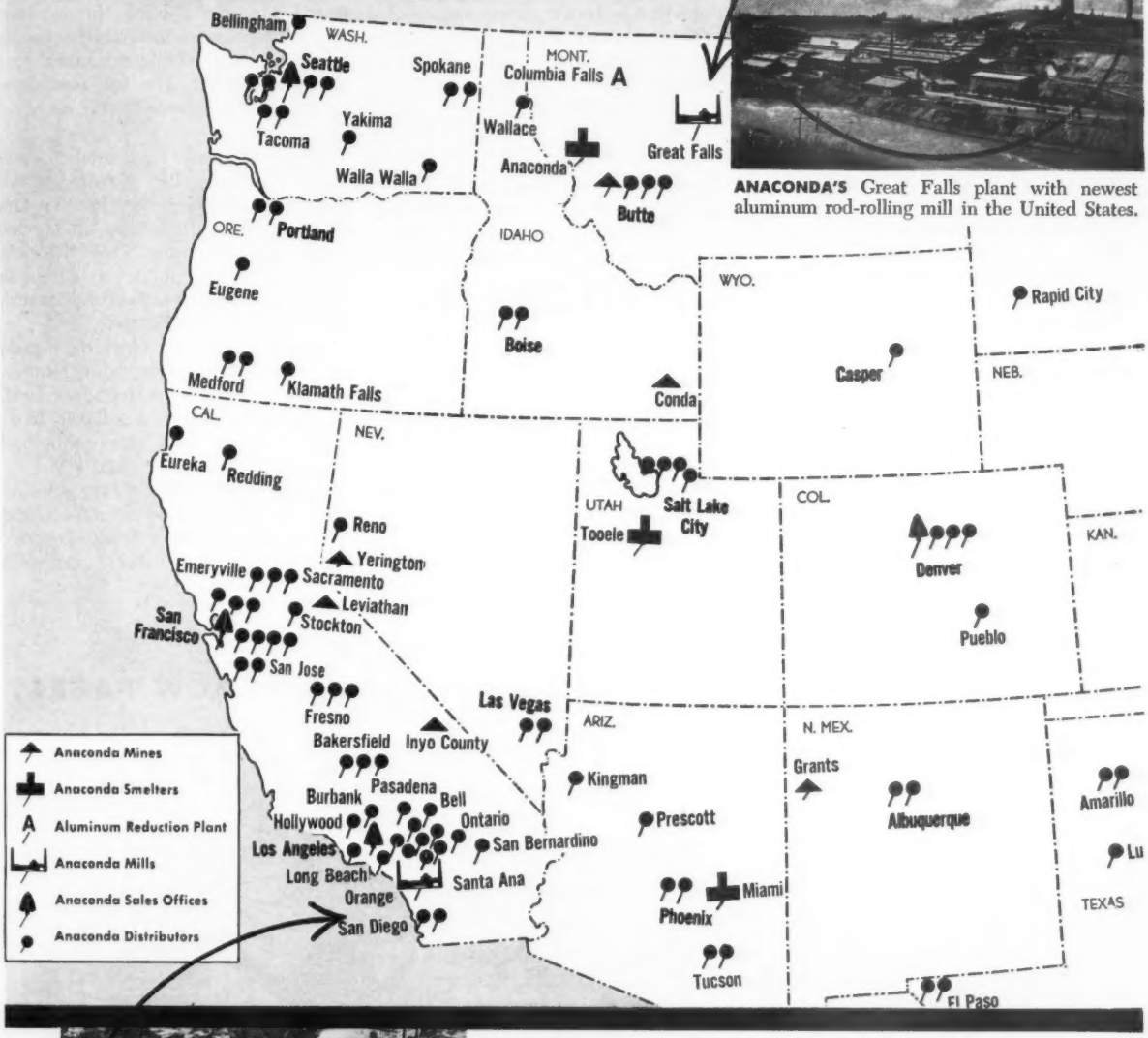
Acidic compounds are somewhat more restricted in use than the other types of detergents. Their chief use is

COMBINATION of good lighting, protective clothing, overhead conveyor, tank containing stripper, and basket to clean large volumes of parts improves the morale of cleaning crews.

In the West to serve the West —Anaconda for Wire and Cable



ANACONDA'S Great Falls plant with newest aluminum rod-rolling mill in the United States.



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descaling, and their chief advantage is that, unlike raw acids, they are inhibited—their action stops once rust and scale have been removed, and they have no effect on sound metal surfaces.

Sometimes a combination of acid and solvent detergents do a job more satisfactorily than would one material alone. One such combination is used to remove light oil and rust, and to condition surfaces for painting—all at the same time. The material actually coats the surface with a fine phosphate film that anchors the paint, resists under-paint corrosion. Another acid-solvent combination does an efficient job of removing petroleum based carbon from heat exchangers.

Methods are often as important as materials. The one best method for any plant depends upon a number of factors: the size of the units or equipment to be cleaned; the ease with which they may be moved about; the volume of pieces to be cleaned; the availability or ease of installation of steam, gas, or oil heat; the area in which the actual cleaning will be done.

The solution-lifting steam gun is probably the most versatile piece of equipment available for cleaning heavy and intricate machinery. It may be used with a steam generating unit, or may simply be hooked up to the plant's own steam supply source.

Its operation is quite simple: one line is connected to the steam source, the other to a solution container. Steam rushing through the head of the gun creates a partial vacuum into which the solution is drawn. Steam and solution then mix and are forced through the gun's spray head under pressure to literally blast dirt off surfaces. You get a combination of heat, force, and the powerful cleaning ability of the detergent.

One model of the gun may be used with either steam or compressed air, so that either alkaline or solvent detergents may be sprayed through it.

An aluminum refinery uses the steam gun and a heavy-duty alkaline detergent to remove pitch and coke deposits from machinery. They formerly scraped the deposits off by hand.

Steam test conducted

A test conducted in a steel mill between one man using the steam gun and four men using kerosene to clean a recoiler, showed the steam gun could do the complete job in half an hour, whereas the men working with kerosene had barely started making inroads on the soil and were barking their knuckles rather painfully.

A brake manufacturer found that the same material he was using to clean oily floors and loading platforms was adaptable to use in the steam gun. He applied the solution under air pressure through the gun to punch presses, drilling machines, and other equipment. The job was done in a matter of minutes, with no hand work at all.

The gun has also been used successfully to clean filter screens, brass reduction machines, unit heaters (no dismantling here), lathes, lift trucks, compressors, pumps, wire drawing machines, and even a complete foundry, including supporting beams, mixes, and overhead cranes.

Another piece of cleaning equipment that has proved its value in maintenance cleaning is the Hot Spray Unit. It consists simply of a solution tank, pump, motor, and spray gun, all mounted on a wheeled chassis.

Solution is made up in the solution tank, the unit's switch turned on, and the solution sprayed through the gun, effectively cleaning without brushing.

NEW Arc Welding System using Murex® CROLOY Electrodes

for Welding CHROME-MOLY STEEL used in HIGH TEMPERATURE — HIGH PRESSURE SERVICE

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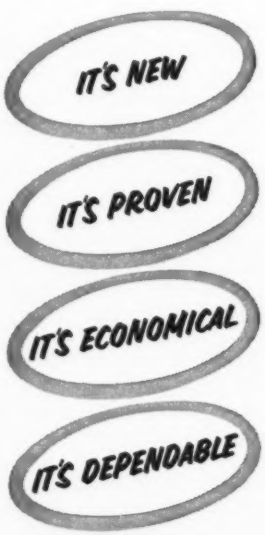

M & T now brings you a new arc welding system using Murex CROLOY electrodes for fabricating and repairing chrome-moly steel equipment used in high temperature—high pressure service.

For years one of the nation's foremost producers of power piping and high pressure boilers has been using CROLOY electrodes in production. Their experience has proven the excellent operating characteristics of the electrodes, the dependability of the welds under high temperatures and pressures, the economy of the welding system.

With the new system you can greatly simplify preheat and postheat operations . . . you can practically eliminate underbead cracking, forget about costly defective welds . . . you can dispense with stress relieving on many weldments . . . you can weld chrome-moly steels more economically.

Murex CROLOY is a chrome-moly weld metal of outstanding stress rupture characteristics and high ductilities over a wide range of temperatures. Further information is available on this new welding system and the unique electrodes that have made it possible. Just write, or have a Murex man call.

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No guesswork in LUBING MOTOR BEARINGS

It's a matter of knowing what lubricants to get and how to apply them . . .

FROM a lubrication standpoint, electric motors may be classified into two main groups. Class 1 is the plain or sleeve type bearing motor; Class 2, the antifriction bearing motor.

Viscosity, or the ability of an oil to flow, is certainly one of the most important requirements. Speaking very generally, it may be said that oils low in viscosity should be employed for small bearings, high surface speeds, low pressures, low ambient temperatures, and with bearings known to be in good mechanical condition; while higher viscosity oils should be employed for larger bearings, low speeds, high pressures, high ambient temperatures, and for bearings known to be in bad mechanical condition.

Application important

Do not overlook the importance that the application method will have on the lubricant used. The lubricant must reach the point to be lubricated or it is of no value. If, for example, wick feed or waste pack lubricant application is employed, the ease and rapidity of the feeding of the lubricant through the wick or packing is of concern.

Too much oil can cause oil creepage into the motor, or too little oil results in starved bearings. The means by which the lubricant reaches the bearing must be such that it will properly handle the lubricant of the viscosity required by the bearings without bearing starvation or without loss through excessive feeding.

The lubricant must also have sufficient pressure resistant qualities to withstand the load placed on it, particularly with heavily loaded equipment. Sudden or shock loading results in the lubricant having to instantly absorb a heavy blow without rupture of the lubrication film.

It must also prevent rusting of motor parts during down-times, over holidays, weekends, etc. Oils are now available in which the natural rust-inhibiting qualities have been enhanced by the addition of rust-preventing additives, and when properly applied assure rust-free surfaces over even extended periods of down-time.

It can be seen by the accompanying table that in general the plain or sleeve bearing motor in normal service will require an oil ranging from 100 to 700 degrees Saybolt Universal at 100 deg. F. Exceptions are of course recognized and should be treated as such.

The vast majority of anti-friction motor bearings, whether ball, roller, or needle type, employ some form of grease as the lubricant, which to function satisfactorily, must:

1. Keep the rotating surfaces of the bearings continually wet with a film of oil.
2. Dissipate frictional heat.
3. Prevent rusting or other corrosion of the bearing surfaces.
4. Resist oxidation, oil separation, and other forms of deterioration.

In addition, greases are often called upon to act as seals to keep the "working" grease in the bearing and contaminants such as dirt, water, fumes, etc., out of the bearings.

Normally, a grease lubricated bearing should be filled not more than half full. Too much grease can cause overheating, leakage, and grease seal destruction. To avoid the evils of overlubrication, many operators have removed the grease fittings after the motor is lubricated and replaced them with solid plugs.

This is a perfect method of overcoming the oiler's irresistible urge to give it a squirt or two every time he passes with grease gun in hand. At regular prescribed intervals the plugs are taken out, old grease removed, and new grease installed. Then, be sure to remove the fitting again and replace the plug.

Another problem is far too often overlooked in the field. How many times have you seen grease guns placed on the ground between uses? How many times have you seen dirty containers used to carry oil to the point of application? The storage of lubrication equipment in areas exposed to rain or wind blown dirt is a very common occurrence.

Proper cleanliness to keep contaminants from the oil, waste pads, and drip oilers is essential at all times. Motors which may stand idle for long periods should always have their lubricant systems checked before starting to assure the presence of ample clean unoxidized oil.

Rough viscosity guide for oil selection

1. For very light duty high speed bearings, a lubricant with a viscosity of 95 to 100 seconds Saybolt Universal at 100 deg. F.

2. For light or medium duty and medium high speed bearings, a viscosity of 125 to 150 seconds Saybolt Universal at 100 deg. F.

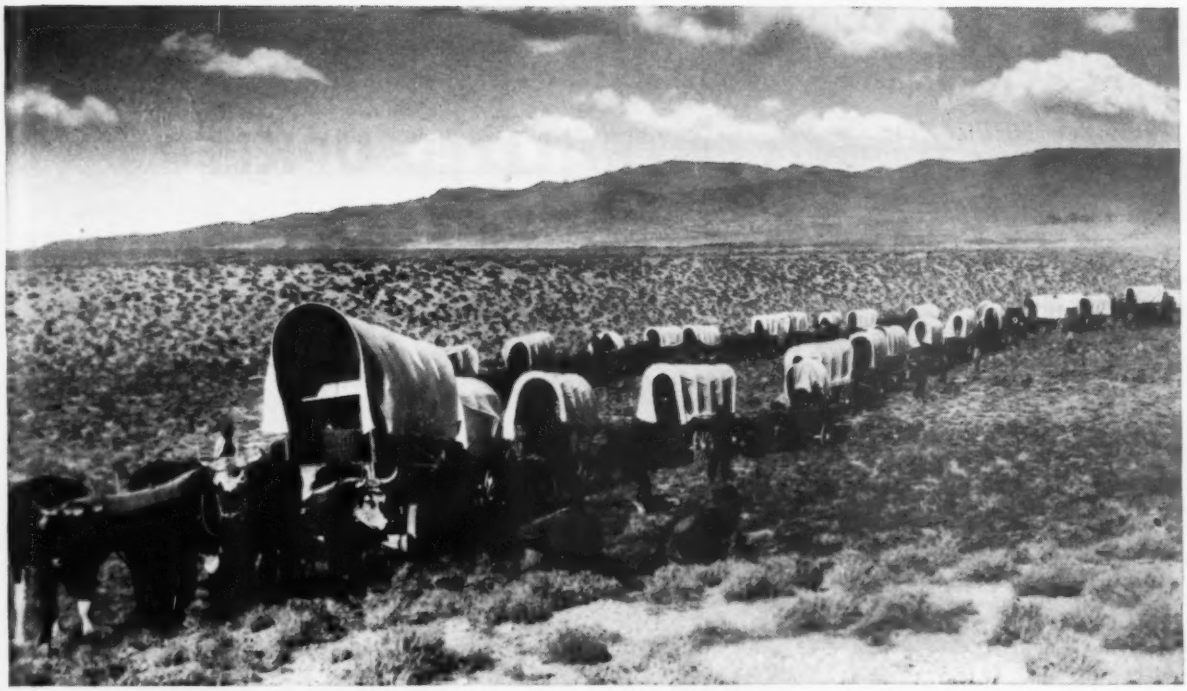
3. For medium duty, medium or high speed bearings, a viscosity of 150 to 200 seconds Saybolt Universal at 100 deg. F.

4. For medium or heavy duty and medium or high speed bearings, a viscosity of 200 to 300 seconds Saybolt Universal at 100 deg. F.

5. For heavy duty, slow or medium speed bearings, a viscosity of 500 seconds Saybolt Universal at 100 deg. F.

6. For heavy duty, slow speed bearings, a viscosity of 700 seconds Saybolt Universal and up at 100 deg. F. depending upon the load.

This article is based on a paper prepared by Technical and Research Division of The Texas Co. and delivered by E. E. Perso, supervising engineer, Los Angeles, before the Electrical Maintenance Engineers Assoc.



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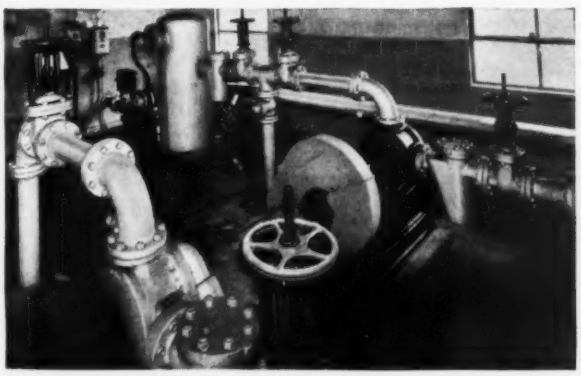
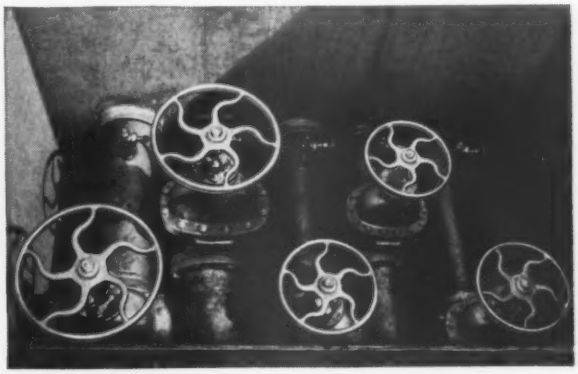
The covered wagon gave way to the "iron horse" because steam had come under man's control—control with valves. Today you travel by diesel or electric road, by water or air, dependent on valves for a thousand controls. For today, control of water, steam, oil, gas and other fluids is basic to all industries.

By rigid adherence to quality through a century of manufacturing, Crane valves have earned the reputation for assuring better flow control with lower piping maintenance cost. They're the first choice of thrifty buyers—that's why more Crane valves are used than any other make.



"PAYING ITS OWN FREIGHT"—More than 5 years ago, The Cincinnati Union Terminal Railroad built this diesel fueling system with Crane valves and fittings: Recently they reported: operation entirely satisfactory; piping maintenance cost to date—zero. That's typical Crane quality—serving all transportation industries with complete lines of brass, iron, steel and alloy piping materials.



LIFELINES OF AN AIRPORT—Leading air terminals choose Crane equipment for aviation fuel systems—a confidence well placed. For Crane keeps pace with all customers' needs—by steady product development, quality mass production, and thorough testing. There's where thrifty buying begins. Crane Co., General Offices, Chicago 5, Ill. Branches and Wholesalers in all industrial areas.

CRANE CO.

for the THRIFTY BUYER

VALVES • FITTINGS • PIPE
KITCHENS • PLUMBING • HEATING

CRANE'S FIRST CENTURY...1855-1955

CENTRALIZED UPKEEP for scattered operations

A mobile unit solves the problem

By
R. J. SMITH
Electrical Maint. Engineer
E. K. Wood Lumber Co.
Los Angeles

The situation

Our company is engaged chiefly in lumber sales and in this connection does a great deal of what we call "remanufacturing" of lumber. Electrical equipment is used in the process of resawing, planing, and running the many details and shapes used in cabinet, sash, and door manufacture.

Our main plant has an electrical load presently of about 1,400 hp.; however our maintenance department has the responsibility of maintaining all the equipment in our Southern California operations, and since our various plants are somewhat widely distributed, we have some rather unusual problems. The outlying plants have connected loads varying from a few horsepower to as much as 900 hp. per location.

The types of equipment encountered in our operations are quite varied also. The familiar 3-phase, squirrel cage, induction motor fulfills most of our power needs, but we require high speed on many of our machines and, in order to get this speed, we use frequency changers and many small series universal type motors.

The head motors on the type machine using the frequency changers are 2-pole, 3-phase, 230-v. at 60 cycles. We change the frequency through a motor generator set to 100 cycles and approximately 385 v. and thus obtain head speeds of 6,000 rpm.

Direct current equipment consists of that used on cranes and that used for plate supplies for our electronic equipment. Our electronic equipment consists of smoke detection instruments, the usual plant inter-com systems, and electronic glue drying machines.

In addition to our other maintenance duties we also maintain the automotive electrical equipment on some 70 vehicles consisting of trucks, lumber carriers, fork lift trucks, etc.

Who does it?

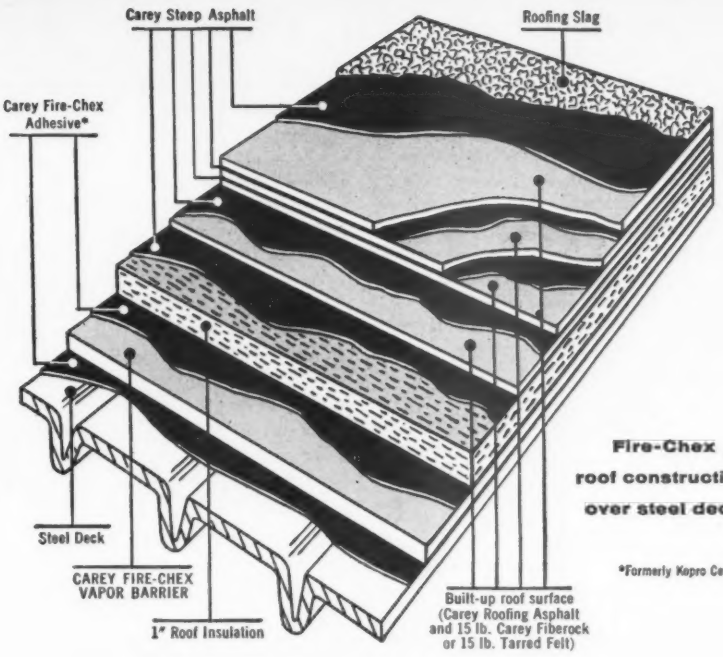
While the exact number of men required to maintain our plant's electrical equipment may seem small, the overlapping of skills is such as to enable us to get by with a small force. Not counting the mechanics, who are used almost exclusively for automative repair work, our force is as follows:

A maintenance superintendent
A full-time maintenance electrician
Two millwright machinists
A welder
An office clerk

We have employed as many as three electricians, but only when new construction made it necessary. By confining the electricians' time to jobs that are "strictly electrical" in nature and leaving much of the motor cleaning, lubrication, bearing replacement, etc., up to the millwright machinists, we have managed to do a good job with this force.

To augment the results obtained through our maintenance force, we have attempted to educate our production employees in some of the fundamentals of good operating procedure and have encouraged them to report promptly anything that they suspect may be wrong or going wrong with their electrical equipment. This system has produced gratifying results

Removes all doubt about the fire-safety of built-up roofing!



Carey Fire-Chex Asbestos-Plastic Vapor Barrier

Application is Easy—
Simply apply Carey Fire-Chex Adhesive* with brush or spray over entire deck. When adhesive becomes tacky . . .

Apply a full 36" wide sheet of Fire-Chex Vapor Barrier, sanded side to deck. Allow 3" side lap, 6" end lap.

Seal both ends securely with Fire-Chex Adhesive. Continue application, lapping each sheet 3". Now apply insulation and built-up roofing.

In Carey FIRE-CHEX, you have a vapor barrier that *does not contribute to fire and cause it to spread!* Even when installed over a standard steel deck that becomes red-hot in a fire, FIRE-CHEX remains intact—*does not release melting asphalt and excessive gases!* Product of over a million dollars invested in development, tests *prove* FIRE-CHEX removes all doubt about fire-safety in built-up roofing.

Why take chances with ordinary, hazardous vapor barriers that have been responsible for multi-million-dollar industrial plant fires? FIRE-CHEX assures you priceless protection for your buildings—*and is available for just a few cents more per square* than the conventional type.

Write today for a sample of this Carey dependable product, and for your copy of the FIRE-CHEX Specification Sheet. Or, request a Carey Industrial Sales Engineer to call. Address Dept. WI-4.

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Asbestos-Plastic
Fire-Chex Vapor Barrier
...does not contribute to fire!

THE PHILIP CAREY MANUFACTURING CO. Lockland, Cincinnati 15, Ohio In Canada: The Philip Carey Co., Ltd., Montreal 3, P. Q.

Built-up Roofs • Asbestos and Asphalt Saturated Felts • Roof Coatings and Cements • Fiber-Flex Glass Roof System
Careystone Corrugated Asbestos-cement Roofing & Siding • Thermal Insulations

and done much to promote plant safety and economy.

Because our maintenance staff is small, we must select our men carefully. They must have adequate experience and maintenance education, integrity, and the analytical mind which is common to all really good trouble shooters. With men of this caliber our maintenance schedules need not be so rigorous as those required in large plants.

When?

Lubrication. Weekly cleaning and lubrication checks are conducted by our men in addition to the similar daily cleaning and lubrication by the machine operators. We must be most strict in this matter because sawdust has a "wicking" action on oil and will deplete the oil supply in the bearing reservoirs if allowed to accumulate. Since it is an excellent heat insulator, it will clog the winding and cause burn-outs due to insufficient ventilation.

Also, if removal of oil-soaked sawdust is neglected for any length of time, it will cause deterioration of winding insulation and may even cause motor burn-out due to frictional heat between rotor and stator. After a motor is blown out with compressed air, the oil level must be rechecked before the motor is run because the compressed air stream will sometimes siphon oil out of the bearing reservoirs.

Starter contacts. Starter contact inspection and maintenance is scheduled once each month for oil starters, with an oil change once each year. Magnetic starter contacts are inspected and dressed or replaced as needed at six-month intervals, except on drives under heavy load conditions. These must be cared for at two-month intervals. Drum controllers (principally on molders) are overhauled completely once each year and contacts are dressed, adjusted, and lubricated lightly with vaseline at six-month intervals.

Gap clearance. Gap clearance on motors is checked yearly if the motors are ball bearing machines. Sleeve bearing motors are all checked each six months and a few of the sleeve bearing types with the motors on rocker bases and where flat belt drives are used under heavy tension are checked more often.

Insulation. Insulation resistance to ground is checked at the time we make the gap clearance checks. This data on each motor is filed in a card index system. If possible, we make the test when the motor is up to operating temperature. While it must be realized that different types of equipment will have different values of insulation resistance, we have tried to establish limits which for our purposes are adequate.

We feel that for our 440-v. motors, resistance to ground should not be less than 500,000 ohms and for 110-v. motors should not be less than 150,000 ohms. We use a direct reading megohmmeter with a test potential of 500 v. DC in making insulation tests.

Equipment used

Due to our decentralized operation, we use a mobile service truck which has complete lubrication equipment, an air compressor with a variety of air powered tools, such as an air drill, air grinder, impact wrench, etc. We originally intended to use this unit solely for automotive maintenance, but it is also very convenient to use the air and lubrication units to clean and service motors in our branch yard locations.

A small cabinet stocked with contacts, fuse links, assorted hardware, and other electrical parts can be readily taken along to handle minor electrical repairs and preventive maintenance operations.

This mobile unit visits each yard once a month. We contemplate putting another of these units into service very shortly because we have recently further decentralized our operations.

We are able to get more reliable maintenance with our own employees and are in a much better position to keep our inspection records accurate and up to date through use of the mobile unit.

The mobile unit also facilitates buying of parts, apparatus, and supplies by one man from the central maintenance office. Since he is in touch with all of the various operations, he can expedite repairs and can keep an adequate stock of supplies on hand at the central location. This inventory can be kept smaller than the sum total would amount to if parts were maintained in substantial quantity at each plant.

This article is based on a paper prepared by the author and delivered before the Electrical Maintenance Engineers Assoc. in Los Angeles.

TYPE RHU

RADICON

Speed Reducers

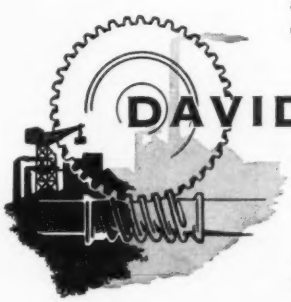
Every component part in the Radicon design provides its quota in increasing the high standard of *efficiency, load carrying capacity,* and ability to maintain *trouble-free service* in operation.

- *Highest quality materials*
- *Centrifugal cast bronze worm wheel*
- *Ground nickel-molybedenum steel worm shaft*
- *Positive oil circulation to all bearings*
- *Functional casing design incorporates scientific cooling***

- *Efficiency up to 95%*
- *High load carrying capacity*
- *Cooler running temperatures*
- *Most compact unit manufactured*
- *Lower cost*

Immediate delivery from .03 HP to 110 HP;
5/1 ratio to 60/1 ratio (11 different sizes)
Short delivery on vertical shaft and other types.

**Fan is attached to an extension of worm shaft, and operates in both directions of rotation. Cold air is directed over external longitudinal ribs.



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STEEL AND BRONZE CASTINGS • SPIRAL BEVEL UNITS • GEAR CUTTING TOOLS

Don't need preventive maintenance?
Then ask yourself these four questions:

1. Are you satisfied you have obtained the maximum economical service from the material found in your salvage yard?

2. Are you satisfied your spare parts inventories are at a minimum adequate to insure maximum plant efficiency?

3. Are you able to predict with reasonable accuracy when major overhaul of the productive equipment will be necessary?

4. Are you able to schedule major overhaul jobs with minimum down-time?

These 13 points constitute a good preventive maintenance program:

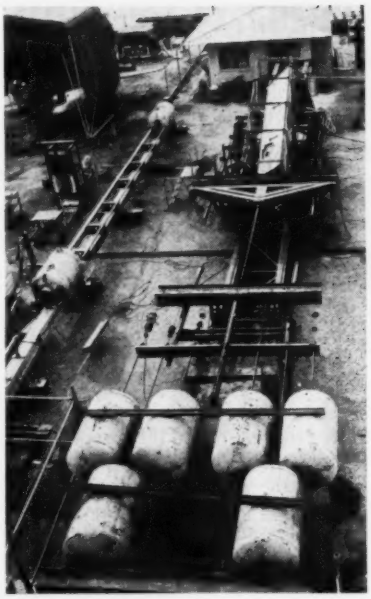
1. **Establish a respect for equipment.**
2. **Reduce the frequency of breakdowns.**
3. **Determine the causes of premature failures.**
4. **Establish the need for changes in design or materials of construction.**
5. **Use suitable lubricants and check on adequacy of present lubricating systems.**
6. **Establish the anticipated life of parts.**
7. **Determine what parts are interchangeable.**
8. **Control and salvage obsolete parts.**
9. **Acquaint personnel with equipment.**
10. **Schedule work in an orderly way.**
11. **Demand written orders and complete written records.**
12. **Make permanent repairs.**
13. **Install trouble-indicating equipment wherever possible.**

ENAMEL PROBLEM
What the porcelain people must face

"IT IS APPARENT that porcelain enamel must be competitive to synthetics," said Glenn A. Hutt, president of the Porcelain Enamel Institute, at its Coast conference in Los Angeles last March.

"Not only in price but in quality (and a higher and better quality). We must have lower temperature coatings, and by this I mean temperatures in the range of 1,200 deg. F. for porcelain enamel on steel. The thickness of coating over the past 15 years has been reduced by 74%. We cannot stop here.

"Our next development should eliminate the blue ground coat. The steel producers can help by producing a sheet that can be coated with white direct-on and in working out the steel problems for lower temperature enamels. Only one steel producer has been successful to date in turning out a steel sheet which will eliminate the blue ground coat, and this only in limited quantities."



AIR COMPRESSION chambers, shown in the foreground, propel fuel cells along this test ramp at Douglas Aircraft Co.'s El Segundo plant providing a simulated take-off by catapult and arrested landing.

FUEL CELLS shock tested

AIRCRAFT fuel tanks are tested on a 12-ft. rail surge test device at Douglas Aircraft Co., Inc., El Segundo, Calif., for capability of withstanding the shock of catapult take-offs and arrested landings.

Compressed air chambers propel the carriage carrying the fuel cells at accelerations equal to six to eight G's.

The carriage is tilted and adjusted to simulate the actual position and angle in which the fuel cell will ride while in service.

Precision instruments record the surge pressures, rates of acceleration and deceleration, G-loads exerted, weight of fuel against cell bulkheads, and the tabulated amount of abuse the fuel cell attachments and fittings will stand.

After each forward thrust, shock cords attached to the carriage arrest its forward travel and return it to position for another simulated catapult take-off.

An example of tests conducted is the recent 1,000 shocks imposed on fuel cells manufactured by the B. F. Goodrich Co. for the Douglas F4D-1 Skyray. Tests proved to the Navy and Douglas Aircraft Co. that the cells would withstand actual operational shocks.

AIR CONDITIONING as a production tool

AN EXAMPLE of the use of air conditioning as a production tool in precision manufacturing and assembly operations, where stability and close tolerances must be maintained, is the Dornson Corp., a metal parts manufacturing firm located on W. Centinela Blvd., Los Angeles.

Stable temperatures were especially needed for the operation of the firm's Pratt & Whitney 1-E jig borer, which operates at 00 tolerances under 68-70 deg. temperatures. The expansion and contraction of metal parts—aluminum parts in particular—were vitally affecting close tolerances. Harry Dobson, owner and manager of Dornson, states that variations of .0008 were noted over a 15 deg. temperature range.

It was decided to air condition the Dornson plant in order to maintain the stable temperatures necessary to precise machining. It is interesting to note that, although the building is located less than three miles from the Pacific Ocean and therefore is in the California coastline's "cool zone," air conditioning was nevertheless required to maintain the proper temperature conditions.

With the installation of air conditioning, the problems of metal expansion and contraction were eliminated. The equipment—a Typhoon Model 214 SC 20-ton packaged air conditioning unit—serves as a ducted central station system, with grilles located at critical spots throughout the plant. It was installed by the D. L. Kissell Refrigeration Co., of Los Angeles. After air conditioning, year-around temperature of 69 to 70 deg. was maintained.

The office area of Dornson's is also air conditioned by this unit. A motorized, thermostat-controlled damper is situated in the ductwork to control the distribution of cool air to the office area, as the lower temperatures required in the plant are not necessary for office comfort. Mr. Dobson reports that, in addition to the elimination of mechanical problems, his employees are pleased at the comfortable conditions they work in, and morale and efficiency are improved.

AIR CONDITIONING unit at the left provides stable temperatures needed for the close tolerance operation of the jig borer, right, and other precision equipment at Dornson Corp.

ALUMINUM EXTRUSION
Rectangular containers for extrusion presses ahead

AT THE Reynolds aluminum extrusion plant in Phoenix, Ariz., noteworthy progress is being made in the "Rectangular Container Program" sponsored by the Air Force, the company reports.

Hitherto, procuring rectangular configurations not now available except by expensive milling operations has been considered a baffling task. The development of a rectangular shaped container for extrusion presses will permit the extrusion of many thin walled rectangular cross sections with greater uniformity in metallurgical characteristics by more efficient utilization of press capacity.

Up to the present, the continued use of the round container—regardless of the cross section of the extruded shape—has seriously reduced press efficiency in many cases.

The extrusion of wide shapes in a folded form introduces the need for an additional set of operations to unfold or flatten the extrusion. The successful development of rectangular containers will permit the extrusion of wider shapes with thinner walls, and greatly extend the extrusion capabilities of present equipment.

Also progressing satisfactorily at Phoenix is the development of hydraulic straightening devices for handling integrally stiffened wing skin extrusions.

Reynold's Phoenix plant has developed a satisfactory method of producing 2.75-in rocket tubing to the exacting requirements of Navy specifications.

FREEZING
experimental work

IMPORTANT facts in the trend toward use of higher scald temperatures in processing frozen turkeys have been determined at Western Utilization Research Branch of the U. S. Department of Agriculture's Albany, Calif., unit. An increase in velocity of minus 20 deg. F. air from 600 to 1,300 fpm. reduced freezing time from 90 to 20 minutes. Lowering air temperature to minus 31 deg. F. reduced freezing time to 60 minutes. Freezing in open tunnel as compared with freezing in boxes reduced time by 300 minutes.

An early look

. . . at exhibits planned for the 2d Western Plant Maintenance Show

Los Angeles, July 12-14

Hose line and socketless fittings

Aero-Coupling Corp. will display a full line of flexible hose lines with detachable, reusable fittings and their socketless fittings and hose. Information bulletins will also be available at Booth 425.

Casters and accessories

The Bassick Co. will offer information on a complete line of casters and caster equipment which includes sealed casters, retractable position locks, and wheel mountings at Booths 420, 422.

Cleaning materials

Cleaning material with sanitizing and deodorizing content, waxes, and other cleaning products will be displayed by *Best Maintenance Supply Co.* at Booths 527, 531. Pertinent literature will also be available.

Fume incineration

The *Bogart Co.* will demonstrate the effectiveness of the Catalytic Combustion Corp. process of consuming noxious stack fumes to odor-free carbon dioxide and water vapor. Literature describing the line of fume incineration processes will also be available at their booth, 604.

Industrial wash-up stations

A new waterless wash station for use of employees in industrial plants, machine shops, steel mills, etc., featuring the use of Ever-kleen skin cleaning lotion and paper towel dispensers will be displayed by *E. P. Gilsdorf and Co.* at booth 622.

Hose and assemblies

The *Imperial Brass Manufacturing Co.* will display a new line of high duty pressure hose and reusable couplings for making up flexible hose line assemblies for high and medium pressure applications. Fluid control valves, tube benders, and other products will also be featured at their booth, 641.

Industrial and maintenance brushes

Brushes with the new Steel Heart handle, a springy steel connector which joins the handle to a light weight block, will be among a line of industrial and maintenance brushes displayed by the *Los Angeles Brush Manufacturing Corp.* at Booth 627.

Floor safety products

The *Walter A. Legge Co., Inc.*, will present a booklet, "Mr. Higby and the Gremlin," which illustrates the use of a safety line of floor cleaners, at Booth 423.

Power sweepers

Literature describing a full line of industrial power sweepers capable of sweeping up to a 54-in. swath and constructed of heavy welded steel will be available from *Modern Power Sweeper Co.* at Booth 518.

Self-drilling expansion shells

The Phillips Drill Co. will display a line of expansion shells, an economical device for fastening equipment and fixtures to concrete, brick, or stone. Pertinent literature will also be available at their booth, 347.

Hose clamps and fittings

A line of hose clamps, tools, and fittings and the ease with which they can be applied will be demonstrated by the *Punch-Lok Co.* at Booth 424. Literature illustrating application ideas and describing the equipment will also be available.

Adjustable lighting units

A new line of universally adjustable incandescent and fluorescent lighting units for industrial and commercial applications will be displayed by *Swivelier Co., Inc.*, at Booth 431. Bulletins containing specifications and information on the unit's capabilities will be available.

Planned plant lighting

Sylvania Electric Products, Inc., will display a portion of their line of lighting fixtures and lamps that apply to lighting in specific problem areas. Literature outlining methods to save money on maintenance and operations of lighting in plants and offices will also be available at their booth, 603.

Floor cleaning equipment

Literature describing a complete line of powered floor cleaning equipment and available brushes will be presented by *G. H. Tennant Co.* at Booth 418.

Wire rope equipment

The *Union Wire Rope Corp.* will present literature including a hand book and rigger's manual on their Tuffy sling, a hoist folder, and other wire rope data, describing their products, at Booth 322.

Electric apparatus and insulation

Westinghouse Electric Corp. will demonstrate a gearmotor, a standard control apparatus, motor insulation, panel boards, transformer repair plans, binaural sound messages, and other products at Booths 517, 523, 525. Literature will be available pertinent to each demonstration.

Multipurpose power sweepers

Literature describing the features and applications of their line of industrial power sweepers with illustrations of possible savings will be available from *Wilshire Power Sweeper Co.* at Booth 415.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July 12, 13, 14, 1955 — Pan Pacific Auditorium, Los Angeles
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WESTERN PLANT MAINTENANCE & ENGINEERING SHOW

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EFFICIENCY! Optimum output is only achieved when your plant is running at top efficiency. And here's the show to help you reach your goal. The Western Plant Maintenance & Engineering Show will show you, in operation, the machines, equipment, supplies and services you need for more effective plant operation.

More than 6000 plant maintenance executives attended last year's show. Many more thousands will this year have the opportunity to **examine** and **compare** new equipment; **discover** new methods of maintenance and plant operation; **find** new ways of reducing costs and boosting production.

2ND WESTERN PLANT MAINTENANCE & ENGINEERING SHOW

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LOS ANGELES · JULY 12, 13, 14, 1955

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- Lubricants and Lubricating Equipment
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- Management Consultants and Services
- Materials Handling Equipment
- Sanitation Equipment and Supplies
- Electrical Equipment
- Power Generation and Distribution Equipment
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Experience tells

Miscellaneous questions answered by maintenance men in a wide variety of plant operations

ASK THE man who is doing it. This appears to be a good answer to the many questions arising from any discussion of maintenance problems. The following remarks are the results of a survey by WESTERN INDUSTRY of plant maintenance engineers in a wide variety of industries.

Establishing methods

"We called in experts from the outside to make, in cooperation with our maintenance staff, a thorough and complete check and recommendation on lubrication of all equipment in use. This resulted in a fixed schedule of lubrication." *Exchange Lemon Products Co., Corona, Calif.*

"Our maintenance schedules are based on the type and age of equipment, type of service, and operating conditions—each piece of equipment being carefully studied and scheduled accordingly. By making a case history of each individual piece of equipment, its age, characteristics, and service to which it is subjected, preventive maintenance schedules can be established which will give much longer life to the equipment at a reasonable cost." *The Zia Co., Los Alamos, N. M.*

"Have a specific plan to remove the apparatus from service at definite intervals in order to follow a system of planned maintenance." *A power company.*

"All equipment is maintained in accordance with manufacturers' recommendations." *AiResearch Manufacturing Co., Phoenix, Ariz.*

"We plan to set up a preventive maintenance program in our plant which will be as simple as possible. The responsibility of the program will rest upon the department managers with the least clerical work possible. Records will be maintained in one location to provide a historical background for future references." *A grain milling company.*

"An informal, but effective, working cooperation with and by the men with all phases of management results in an automatic preventive maintenance program which saves money and

time for management, and results in a safer, more pleasant, and healthy attitude." *Johnson Manufacturing Co., Seattle, Wash.*

General lubrication

"Responsibility of our regular and scheduled lubrication (oiling, etc.) rests with one man in each 8-hour period of operation and to certain equipment. These men are trained for this work with particular emphasis placed on regular lubricating times as lubrication is very essential to our high speed machines." *Exchange Lemon Products Co.*

"We have a full-time lube man who works from a route map and time schedule and lubes by a color system, etc." *Minneapolis-Honeywell Regulator Co.*

"Gear boxes, spindle housings, hydraulic systems, etc., of all equipment acquisitions are drained of oil and replaced with fresh oil according to the lubrication chart, compiled by the lubrication engineers, attached to each machine." *AiResearch Manufacturing Co., Phoenix.*

"We automatically lubricate all possible points and arrange all bearings to use one grade of oil and one grade of grease with as few exceptions as possible." *Johnson Manufacturing Co.*

" . . . Be sure all bearings are properly greased but not too much; be certain no trash accumulates around lubricating openings." *An oil company.*

Pumps, compressors and valves

"Among the most important factors to bear in mind are the type of service (intermittent or constant) and type of bearing (anti-friction or sleeve), speed and type of drive." *The Zia Co.*

"Shut down and repair leaks when detected and provide adequate circulating air around such equipment." *An oil company.*

Power transmission equipment

"Inspection by personnel from a trained group is important. Each group should be trained for certain methods of power transmission." *Exchange Lemon Products Co.*

"Alignment and deterioration are the major factors in maintenance of power transmission equipment." *A copper company.*

"Keep spares at all times." *AiResearch Manufacturing Co., Los Angeles.*

Steam generation and transmission

"Check constantly for leaks. Our boiler is shut down at regular intervals for cleaning and repairs if necessary." *An oil company.*

"Use of a water conditioning system aids in maintenance of our steam equipment. Nalco balls are used every 8 hours. A top overhaul is accomplished on boilers every 4,000 hours of operation." *Exchange Lemon Products Co.*

Costs and labor involved

"The most essential requirement of maintenance is to know one's costs. To know the costs one must have complete, accurate, and timely flow of *all* costs, including labor fringes, material, materials handling, shop and equipment expenses, and general overhead." *The Zia Co.*

Maintenance sketches

The situation at three Western plants as reported to the Electrical Maintenance Engineers Assoc. of Southern California

Automotive

By CHARLES F. KIMBALL
Chief Electrician
Ford Motor Co., Long Beach, Calif.

Size of operation:

486,000 sq. ft.; connected load approximately 15,000 hp. using about 1,000 electric motors ranging from ½ hp. to 350 hp.; a connected load of about 7,000 kva. of resistance welding equipment, a large percentage of which is electronically controlled. This is all operated most efficiently on a maximum demand of only 3,000 kva. Number of people in plant: 1,700.

Preventive maintenance program savings:

Have been able to operate our department with 140 people, as against 180 people before; trouble calls reduced by 90%; improved our position as compared with other Ford plants.

Losses avoided:

The loosened cotter key that caused the loss of 7,200 manhours; the burned-up motor that lost two days' production; the hidden cost of manhours lost, due to eye strain or improper or insufficient lighting.

By preventive maintenance we have prevented motor outage by changing bearings before damage; prevented blow-ups due to overloaded circuits; made equipment last longer by good housekeeping.

Benefits:

Have you ever been on the spot when management wanted you to provide a budget for the next year? A good preventative maintenance system will provide the figures to show where the cost is and how much.

What else?

It also will provide management with complete technical information for future planning, thus saving much time and money. It may cost a few extra manhours at the start to put in a preventive maintenance program, but it will soon save many breakdowns and costly replacements. The program should be started as soon as equipment is received and installed.

Should include:

1. Proper records.
2. Anticipated repair parts listed and purchased.
3. These parts kept in their proper place.

Essential points:

1. Determine the work to be done by a complete survey.
2. Use check sheets to do all routine maintenance and inspections on schedule.
3. Do all work by way of written requests.
4. Maintain a complete history on every piece of equipment.
5. Organize performance data periodically for plant engineering study.

Oil refining

By HENRY SCHUMACHER
Electrical Engineer
Richfield Oil Co., Watson, Calif.

MOTOR bearing life is governed by three factors: vibration, alignment, and bearing fit.

Vibration:

This is caused by poor inside motor alignment and bearing fitting. We

use two types of instruments to check vibration. One is a General Electric instrument which measures the amplitude of vibration; the other is a Westinghouse reed-type measuring device which also gives frequency of vibration.

Instrument check of one noisy bearing indicated a varying number of frequencies up to about 19,000 per minute. Replacement of the bearing reduced frequency to 3,600 reading and 7,200 reading, its first harmonic. These were reduced 50%. Old bearing was dismantled and we found two catches on the outboard race.

Alignment:

It is difficult to get the machinist to align motor properly. They seem to feel that a fast coupling has 1/16 in. leeway, so "why worry until you get above 1/16 in?" They should be taught to reduce the amount of leeway.

Bearing fit:

Manufacturer's specification for tolerance data should be observed. We had some motors built during the war and the fits were not what they should have been. A bearing can be too tight. I took an armature to a machinist to fix the bearing. He cut it too tight; you could turn it in your hand and feel it drag along. I got him to cut it down some more and it gave a good fit.

If a bearing is too loose, there is no chance to unload heat. A look at the inner race of a bearing that was getting hot showed a bright area where it contacted the shaft. One small blue spot showed where it did not contact the shaft. The blueness indicated that the heat was not being taken away fast enough. Heat leaves bearings by conductivity.

Steel fabrication

By FRED C. TRANKLE
Soule' Steel Co.
Los Angeles

THE MAINTENANCE department at Soulé Steel Co.'s Los Angeles plant consists of a foreman, an assistant foreman, four maintenance men—one for electrical maintenance, one for all night shift maintenance, and two for mechanical maintenance who are also capable of handling a limited amount of electrical work—and one oiler.

The plant is supplied with 3-phase 480 v. current from Edison transformers located on the property to a 2,000 amp. Bull Dog vacu-break panel protected by an overload device installed and maintained by Edison Co. This overload can also be tripped by

an emergency pushbutton located on the face of our panel.

Our connected motor load, made up principally of squirrel cage induction motors, totals about 2,500 hp. from about 200 pieces of equipment ranging in size from ¼ hp. to a 100 hp. compressor motor. Another major portion of our power load is made up of welding transformers totaling 1,000 kva. and 480 to 240/120 v. single-phase transformers totaling about 250 kva. These transformers are distributed throughout the plant to supply lighting power.

Uses card index:

One of the most important items in our maintenance department is a card index file. A separate card is kept for each piece of equipment, listing every item of useful information available —date of purchase, from whom purchased, the cost complete or in units, and if possible the weight of the equipment.

All motor and starter data, belt number, sheave sizes, and any other data that should be readily available are also noted on this card. A separate file envelope containing parts lists, wiring diagram, lubrication data, and special maintenance instructions is kept with each card. These are checked carefully before filing to be sure nothing of importance has been left out. All of the pertinent information on each piece of equipment is then readily available to each man in the department.

When new machines are installed and the information sheets have been studied, we list the replacement parts that should be kept on hand. This list usually includes coils, special bearings, starter or relay contacts, brushes, and possibly electrical air valves, and their operating coils. Quantities required are determined by the importance of the machine's production or the time involved in obtaining the parts.

Welder generators:

Nearly 50 arc welder motor generator sets are in continual use at our plant and commutator care is an important item of maintenance. During a monthly inspection of each unit, we check for sticking or short brushes, proper brush-holder setting, and we lightly sand the commutator with 2/0 sand paper.

At three-month intervals, we take each welder, one or two at a time, outside the buildings and blow out the entire machine with compressed air. At this time we check for and replace

worn brushes or starter contacts and if the commutator is ridged or has flat spots, with the brushes raised, we use commstones in three grades until the commutator is again smooth and concentric. Brushes are then lowered and reseated with the use of brush seating sticks.

Welders are greased once every six months, and when bearings require replacing we also turn the commutator in a lathe and then undercut the mica spacers with a hand electric tool made for that purpose.

All of our flash and spot welders are water cooled. The water lines involved are blown out at about six-month intervals and are boiled out with an acid, as per factory recommendations, once a year. Electronic controls, relays, solenoids, contactors, and limit switches on these welders require a weekly inspection. The most important maintenance consideration in this phase is cleanliness—preventing an accumulation of grease, oil, steel scale, or weld slag.

Tools used:

Special maintenance tools used include ground lamps mounted on our main panel and on a sub-panel within sight of the maintenance office. Any ground in the system is immediately detected and remedied. A clamp-on volt-ammeter is used to detect overloads on motors or sub-panels and is used at the slightest suspicion of overload or heating.

A volt-ohmeter is used extensively in control panel trouble shooting and in detecting open circuits or shorted units.

INFRA RED HEAT dries laminated panels

TIME, damage, and space requirements were reduced at Laminated Panels, Inc., Seattle, by installation of a 20-ft. continuous process oven equipped with infra red heaters to dry panels. The old method of operation consisted of laminating plywood panels with plastic sheets, bonding them with cold water glue, and stacking the clamped product for a 24-hr. drying period. The latter step caused damage from slipping, telegraphing of grain, and warpage, and required extensive storage space.

Now, by use of infrared heaters, pre-cut plywood patterns are laminated to plastic and bonded with a thermo-setting adhesive in one minute, after which the panels emerge ready for machining.

Help!

A WESTERN INDUSTRY reader recently asked if we knew of a manual or similar listing of times required to perform each maintenance task. He needs a yardstick with which to measure and estimate maintenance performance and requirements in his plant.

Can you help this reader? Do you need a similar control device? If so, please write to WESTERN INDUSTRY, 609 Mission St., San Francisco 5.

NEW EQUIPMENT AND MATERIALS

FOR YOUR CONVENIENCE the company address follows each item.

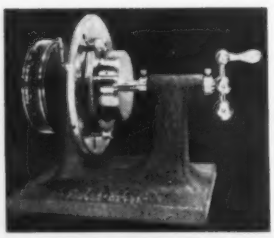
Straddle dump for bulk materials

New hydraulically operated straddle dump device is available for use with Clark 20,000-lb. capacity straddle carrier. Device is U-shaped, with crossbar of the "U" acting as lifting member. Arms are raised by two hydraulic chain hoists to maximum 11½ ft. Load lifting capacity is 16,000 lb. In use, box-like container is picked up and transported by ordinary straddle carrier operation. At dumping site, operator deposits box, backs off, lowers lifting arm to engage fingers on box, and raises arm until contents of box are discharged. All controls are actuated from driver's seat. *Clark Equipment Co., Ross Carrier Division, Benton Harbor, Mich.*

Water-proof treatment for masonry

New silicone water repellant protects masonry buildings from rain and weather and stops efflorescence. It can be brushed or sprayed in one application onto brick, mortar, concrete, standstone, cinder, and pumice block. Coating is not apparent and, furthermore, does not seal pores of material completely—for instance, moisture that may be entrapped in brick before treatment can slowly evaporate. Silicones are said to be as safe to use as oil base paints. *Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.*

Measuring oil seal torque

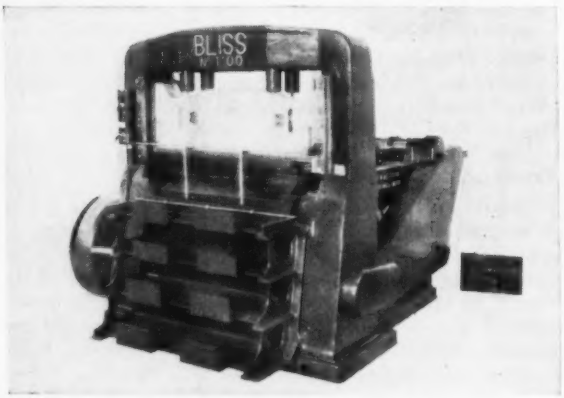


Here is a new instrument for laboratory measurement or factory inspection. The National oil seal torque meter uses a self-centering, 3-jaw chuck to position oil seal concentrically with test shaft. Rotation of test shaft by hand crank actuates a calibrated drum to a point where oil seal's torque is matched by resistance from coiled spring inside drum. Pointer indicates torque in pound inches on scale. Available in two models: 615, for measuring torque to 15 lb. in. in oil seals ¾ to 6 in. o.d.; and 860, for reading torque to 60 lb. in. on seals 2¾ to 8 in. o.d. *National Motor Bearing Co., Inc., Redwood City, Calif.*

New curing agent for epoxy resins

Shell Chemical offers a new modified amine curing agent, recommended for epoxy castings, potting, and adhesives and laminating applications where room temperature or moderately elevated temperatures of curing are desired. Low vapor pressure minimizes odor associated with unmodified polyamines. New product is designated Experimental Curing Agent U. *Shell Chemical Corp., 50 W. 50th St., New York, N. Y.*

Handles larger sheets, at faster speeds



New Bliss machine (Model 1100) is designed for high-speed blanking of scroll strips for can ends, bottle caps, and jar tops. Its wider bed can handle larger sheets, up to 36 in. square, allowing more strips per sheet, states manufacturer. Other advantages claimed are: ample room for new dies, adaptability to double and triple dies, elimination of lubricant dripping onto sheets. Can be arranged for automatic or hand feed. *E. W. Bliss Co., Canton, Ohio*

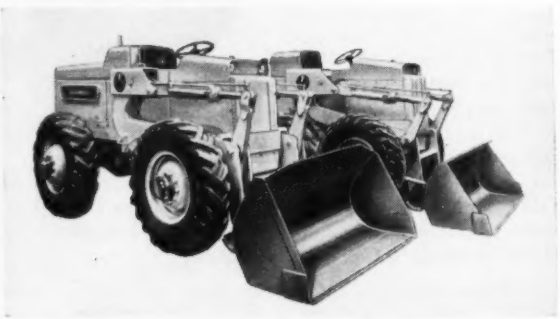
Idler parts washer

This unit (Model PW 2) is designed for washing grease and dirt off carburetors, generators, brake parts, air filters, and other parts. It can also be used as a coolant pump for lathes, drill presses, and similar machines. Centrifugal-type pump, 4 gpm. capacity, is suitable for coolant, cutting oils, water, solvents, or any non-explosive light liquid. Adjustable valve in hose permits choosing desired flow, using spray nozzle or solid stream. Complete unit sits on any standard 5-gal. container and can be moved from one container to another. *G & S Manufacturing Co., 2824 E. Washington St., Phoenix, Ariz.*

Table-top stitcher with punch

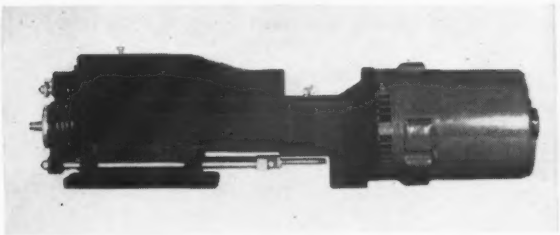
New arm-type wire stitcher, which requires little more than a square foot of bench space and weighs only 59 lb., is recommended for closing bags, attaching them to cards, assembling light chipboard boxes, or fastening labels to merchandise. Stitcher uses round wire drawn from continuous length 5-lb. reel and forms stitches and clinches them at 200 per min. in material up to ⅛ in. thick. Control is by an electric foot switch or work-actuated trip. *Acme Steel Co., 2840 Archer Ave., Chicago 8*

Two new tractor-shovels



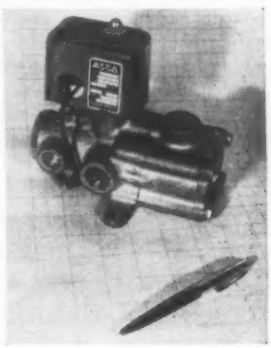
One of the outstanding features of these two new Payloader models, states manufacturer, is design which permits 40 deg. of bucket breakout at ground level rather than at 3 or 4 ft. carry position. To obtain maximum loads, a powerful pry-out action is accomplished by using breakout pads on ground as fulcrum for leverage. These are patented features on the Model HU (with 1 cu. yd. heaped capacity) and Model HH (with 1½ cu. yd. heaped capacity), which also have new boom-arm design which eliminates need for safety guards or screens. *Frank G. Hough Co., Libertyville, Ill.*

For direct-spindle tapping



Compact, light-weight "controlled-air-power" unit eliminates tapping heads and clutches and permits direct-spindle tapping. It consists of Bellows-Locke Model 5-E drill unit, with special in-line mounted G-E hi-slip motor for 220/440 v. 3-phase operation. Spindle traverse is adjustable from 0 to 3 in.; thrust is approximately three times applied air pressure. Tap sizes can range up to 5/16-18 or 3/8-24 in. mild steel. Easy grouping for multiple operations; units may be mounted at any angle in any plane. *Bellows Co., Akron, Ohio*

New ASCO valve sits tight



New 4-way, poppet type solenoid valve, designated Bulletin 8344, is claimed to eliminate piston malfunction due to binding or residual magnetism, and to provide greater safety, minimized leakage, and cycling rates up to 850 per minute. Power operated in both directions, total moving parts have been cut to three in number, for easy maintenance and longer valve life. Pressure on valve discs forces them against the metallic junction of the disc and seat in an effective seal. Available as either a single or dual solenoid, depending upon electrical circuit involved. Cycling rate ample for ordinary requirements of punch presses, welding machines, indexing operations, and air-operated clutches and brakes. *Automatic Switch Co., 391 Lakeside Ave., Orange, N. J.*

NEW EQUIPMENT

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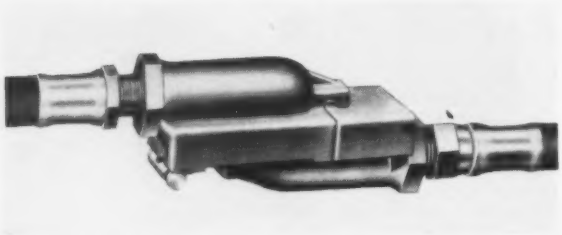
Seals in oil, seals out dirt



Char-Lynn Hydra-Seal coupler is a quick-connect hose coupler, which features free flow of fluid when connected and is self-sealing on breakaway. No tools are needed to couple or uncouple. Die cast of high strength corrosion-resistant aluminum alloy and treated to provide wear-resistant surfaces. Now available in 3/8 and 1/2 in. S.P.T. *Char-Lynn Co., 2843 26th Ave. S., Minneapolis 6, Minn.*

Shiplap edge on panelboard

Masonite Panelgroove, new siding of 5/16 in. Tempered Presdwood, has 3/8 in. wide and 1/10 in. deep grooves, spaced 4 in. on center, that give the appearance of vertical board construction. Board has a shiplap joint treatment, with overlap on one edge of 3/4 in. and underlap on opposite edge of 1 1/8 in. This material will be available in 4 x 8 ft. panels or any combination of lengths that can be cut from a 16 ft. panel. Material can be nailed directly to studs or over sheathing. *Masonite Corp., 111 W. Washington, Chicago, Ill.*

Pipe fittings for hard service

New 150-lb. stainless steel fittings are offered for chemical plants, refrigeration, food, and other process industries, as well as for general industrial and laboratory applications. They are recommended by manufacturer for standard pressure services where corrosion is a factor. Available in screw-end and socket-welding types in stainless steel Type 304 and Type 316. *Watson Stillman Fittings Division of H. K. Porter Co., Inc., Roselle, N. J.*

Portable grinding wheel with a sharp bite

Changes incorporated into this Blue Flash raised hub disc-wheel take advantage of the cutting ability of each abrasive grain, states manufacturer. In action, wheel has a new capacity for faster metal removal with less work pressure. Entire underside of wheel also has "bite," permitting easy grinding and blending of external corner welds and convex surfaces. Designed for all weld grinding and portable cutoff work in metal fabricating plants and foundries. Available in 7 and 9 in. diameters, thicknesses of 1/8, 3/16, and 1/4 in. *Bay State Abrasive Products Co., Westboro, Mass.*

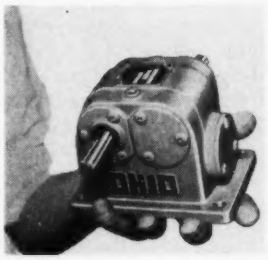
Glass-reinforced plastic tape

Two polyethylene tapes, reinforced with continuous glass filaments, which were originally developed to reinforce plastic panels of weather balloons used by government, are now offered for industrial use. No. 875, with pressure-sensitive adhesive backing, has tensile strength of 150 lb. per inch of tape width. No. 877 is not pressure-sensitive, and has a tensile strength of 100 lb. per inch. Tapes are resistant to most chemicals and remain flexible at —60 deg. F. *Minnesota Mining and Manufacturing Co., 900 Fauquier St., St. Paul 6, Minn.*

Cut maintenance costs on high wire fences

This lambs-wool roller, for coating wire fences, has an extra long handle to simplify maintenance of hard-to-reach wire fence sections. Hardwood handle, 10 in. long, provides an overall reach of 20½ in., which is claimed to be just right for anyone of average height to work up to 9 ft. high without stretching. Handle can be shortened for alternate use, if desired. Extra-heavy nap (1½-in. thick lambs-wool) coats just about all the way around the fence in one operation. *Rust-Oleum Corp., 2799 Oakton St., Evanston, Ill.*

DOX speed reducer redesigned



New horizontal DOX double reduction speed reducer with zinc alloy housing is available in ratios of 4:1 to 1,600:1, torque capacities of 25 in. lb. to 150 in. lb., utilizing 1/6 hp. Recommended by manufacturer for pump drives and other light industrial applications. *Ohio Gear Co., 1333 E. 179 St., Cleveland 10, Ohio*

Individual heat controls

New electric oven has three chambers 3 x 3 x 3 ft., with heat controls up to 1,000 deg. F. on each chamber. Equipment includes indicating temperature controller, and Inconel sheathed tubular heating elements with outside terminals. Interior of chambers is stainless steel. Fully automatic operation with vertical flow air circulation. *Grieve-Hendry Co., Inc., 1401 W. Carroll Ave., Chicago 7, Ill.*

Something new in conveyor belts

Said to be 400% stronger than conventional cotton reinforced conveyor belts, this belt is reinforced with new synthetic fabric called Super Raynile and can be spliced in the field without special equipment such as that required to splice steel-reinforced belts. It is recommended by manufacturer for applications requiring a long conveyor in one section, and for lifting materials up steep grades. Suitable for transporting coal, ore, crushed stone, and other bulk materials. Available in widths up to 72 in. and thicknesses up to 15 plies. *Hewitt-Robins Inc., Stamford, Conn.*

NEW EQUIPMENT

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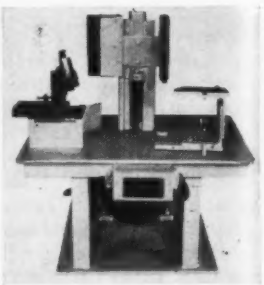
FMC introduces mechanical knife honer



New mechanized honer, available on leased basis from Food Machinery and Chemical Corp., is said to hone knives uniformly and with exact bevels, in shorter time, without skilled operators. It has been developed to serve the FMC universal corn cutter. *Food Machinery & Chemical Corp., Canning Machinery Division, San Jose, Calif.*

Aluminum alloy with good weldability

Kaiser Aluminum offers new alloy 5083, which has been developed to compete with mild steel in fabrication and welding costs. It is recommended by company for welded structures requiring maximum joint strength and efficiency plus light weight and corrosion resistance. Available in "0" and H-113 temper plate ranging in gage from 0,250 to 2 in. and standard lengths in widths from 12 to 90 in. *Kaiser Aluminum and Chemical Corp., Oakland 12, Calif.*

For stacking two-ton loads

Latest addition to Yale Warehouser line is a 4,000-lb. capacity model (RSAT-4), which according to manufacturer's claim can lift two tons to height of 147 inches in a 6-ft. aisle. Increased lifting power is made possible through use of slightly heavier channel and fork construction. Standard models are available in 68, 83, and 90-in. overall heights with telescopic lifts up to 90, 120, and 134 in. respectively. Can be used with all Yale Warehouser attachments. *Yale & Towne Manufacturing Co., 11000 Roosevelt Blvd., Philadelphia 15, Pa.*

Clamp-type air cylinder is a good traveler

New 900 series provides quick, easy mounting or removal from jigs and fixtures, states manufacturer, through one-piece aluminum casting with flat base. Cylinder can be installed, relocated, or removed by merely loosening hold-down bolts in slotted holes. Available in 2 in. bore size, 1 and 2 in. stroke lengths. *Modernair Corp., 400 Preda St., San Leandro, Calif.*

No-bolt 20-minute assembly

New natural draft cooling tower, Model SRS, has one-piece steel basin, which requires no assembly, one-piece steel crown assembly, and California redwood louvers which fit into slotted vertical posts. Two men can erect tower in 20 minutes, according to manufacturer. All metal parts are hot-dip galvanized after fabrication. *Dover Manufacturing Co., P.O. Box 498, Independence, Mo.*

New power turret press

New 10-gage power turret started out as a machine for aircraft industry, providing assorted sizes of 20 dies and punch that could be rotated into position in a second. Now it is available for other industrial uses. Operator uses electric foot switch, or a special handwheel at the front which lowers punch into a template or onto center punched mark and sheet to a predetermined point, where machine punches the selected hole automatically. Machine cannot operate unless rotating turrets are locked in place. Weight: 3,400 lb. Depth of throat: 28 in. Number of stations 20. *Diamond Machine Tool Co., Pico, Calif.*

Ball-bearing motors

New line of Wagner Type DP motors with corrosion-resistant cast iron frames is suitable for indoor or outdoor use. Frames are smoothly contoured so that moisture cannot collect on surfaces, and construction is said to be drip-proof, so that they can be used for many applications which require splash-proof motors. Available in rerated NEMA frame sizes 182 through 326; 1 to 30 hp. ratings, 3 phase, 60 cycles, 1,750 rpm. *Wagner Electric Corp., 6400 Plymouth Ave., St. Louis 14, Mo.*

Dozen models and dozen sizes in pallet dolly

Roll Rite introduces new modular type design in universal pallet dolly, providing sizes up to 60x60 in. and load capacities up to 6,000 lb. Designed to transport loaded pallets between station points, dolly can be rolled over rough, slatted floors and turned or steered without casters through 360 deg. Available with either rubber or aluminum alloy wheels and with handle. *Roll Rite Corp., 801 Jefferson St., Oakland, Calif.*

Dual personality in gas-electric truck

Manufacturer claims performance of a gas engine truck with the economy of an electric truck in its Gas-O-Matic line. This 3,000-lb. truck (Model FD-30) is the latest addition, and like the others is operated without clutch and transmission or gear shifting. Travel speed is regulated by an accelerator pedal. Foot-pedal electrical inching control permits high-speed hoisting at low travel speeds. Power is supplied by Hercules heavy-duty 4-cylinder industrial engine. Speed with full load, 8 mph. *Baker-Raulang Co., Cleveland, Ohio.*

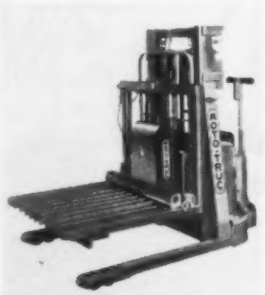
NEW EQUIPMENT

. . . Begins on page 92.

Caterpillar spotlights new diesel engine

All-new Cat D342, which replaces Model D13000 engine, is 5¾ in. bore x 8 in. stroke, 6 cylinder diesel engine, rated at 190 hp. for intermittent duty. Unit is composed of many parts already standard in company's 5¾ in. bore engines. Other features include new, larger capacity water pump, relocation of lines and tubes, capsule-type fuel injection valves. Three starting systems are available: air, direct electric, and gasoline. The D342 industrial and marine engines with attachments are now available. *Caterpillar Tractor Co., Peoria 8, Ill.*

Electric push-pull action for handling dies



New die handling attachment, which can handle up to 6,000 lb., fits any standard Moto-Truc lift truck and is shown here with Hi-Lift model. Unit uses electric power, said to be a time-saver because there are no oil lines to connect and disconnect as in the case of hydraulic attachments. Four-way entry into die attachment permits loads to be pushed and pulled from the sides as well as from the front. *Moto-Truc Company, 1963 E. 56th St., Cleveland 3, Ohio*

Speedy industrial sweeper: the "Special"

New model industrial power sweeper, available in three sizes, will sweep up to 45,000 sq. ft. per hour, according to manufacturer. It features power reverse, 16 brushes on main broom, 3.6 hp. Clinton engine, main broom height control on steering bar, and side brush height control on steering bar. *Modern Power Sweeper Co., 738 N. McKeever Ave., Azusa, Calif.*

Drawer-type and double bank magnets

These magnetic units, states manufacturer, do a near perfect job of removing iron contamination from materials that are surge or choke fed. Double-bank model gives double protection for applications demanding high efficiency. It is available in standard construction with side wings for installing in hoppers and floor openings, as well as in new drawer-type design for installing in vertical closed chutes. Drawer-type model, which also comes with single magnetic circuit, slides into opening made in side of duct. To clean magnets of iron accumulation, drawer slides out and tubes are wiped clean. All units are available in 162 stock sizes and use new magnetic circuit, which is claimed to produce a 15% increase in magnetic intensity. *Eriez Manufacturing Co., Erie, Pa.*

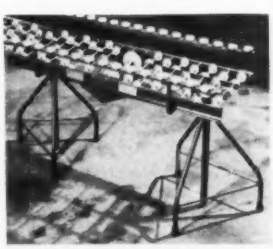
Deep-throat saw has all-round adaptability

This new low-cost DoAll machine, available in a variety of models, is intended for job shops, sheet metal and pattern workers, tool rooms, and light production work. Contour saw has 30-in. throat and 24 x 24-in. work table, which tilts 45 deg. to right and 10 deg. to left. Twenty different attachments are available to adapt the machine to specialized operations — among them, filing and polishing, carbide tool finishing, band filing, circle cutting, mitering, ripping, friction sawing. *DoAll Company, 254 N. Laurel Ave., Des Plaines, Ill.*

Printed circuits on new speed drive control

New line of full wave Thy-mo-trol electronic adjustable speed drives has print board panels, permitting visual inspection for circuit faults. Panels can be removed and replaced in a few minutes. New control circuit uses a single miniature-type control tube, reducing maintenance in contrast with three conventional sized tubes of former models. Available in two ratings, ¾ to 1 hp., and 1½ to 3 hp. full wave. Stepless speed control from an AC power source over an 8 to 1 speed range. *General Electric Co., 235 Montgomery St., San Francisco 6, and all G-E apparatus sales offices.*

For economical glued loading



Speedglu conveyor is a materials handling unit which automatically applies two thin strips of special glue to bottoms of shipping cases as they come off the conveyor line, eliminating costly manual operation but assuring the added protection of glued packing for fragile merchandise. Unit is a special 4-ft. section of 12, 15, or 24 in. Speedways gravity wheel conveyor and can be used with most Speedways materials handling units. *Speedways Conveyors, Inc., 192 Speedways Bldg., 202 Rhode Island St., Buffalo 13, N. Y.*

Gets around in 81 inches

New Towmotor Model 500 and 500-D fork lift truck is a 5,000-lb. unit, which can handle loads up to 2½ tons, yet is designed to turn in a radius of 81 in. and to operate smoothly in aisles 69 inches wide. Available in both gasoline and diesel powered models. *Towmotor Corp., 1226 E. 152nd St., Cleveland 10, Ohio*

NEW EQUIPMENT

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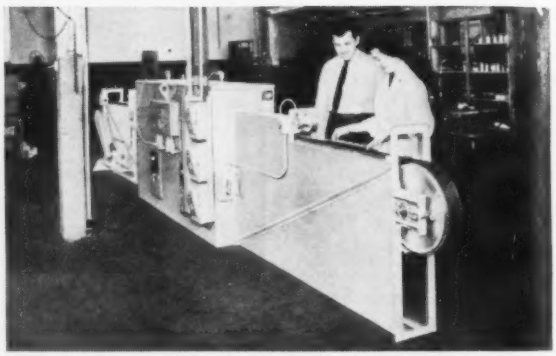
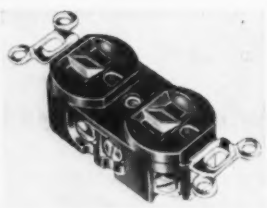
Precision heat control



New electric conveyor furnace controls temperatures within plus or minus 3 deg. and boosts production capacity. At Litton Industries of Beverly Hills, where an electric furnace replaced batch-type ovens, output of small Metalohm resistors was raised about 1000%, manufacturer reports. *Pacific Scientific Co., 1430 Grande Vista Ave., Los Angeles*

For grounding portable electric equipment



Here is a new grounding type duplex receptacle (Type 5252), suitable for use whenever electrical equipment should be grounded as protection for its users. It accommodates both grounding and regular type parallel blade caps and is side-wired with a contact break-off for 2-circuit installation. For conventional wiring, it is equipped with large binding screws. Manufacturer states this duplex receptacle complies with revisions made in National Electrical Code effective January 1, 1955. Recommended for use with portable power tools, appliances, and maintenance equipment. *Arrow-Hart & Hegeman Electric Co., Hartford, Conn.*

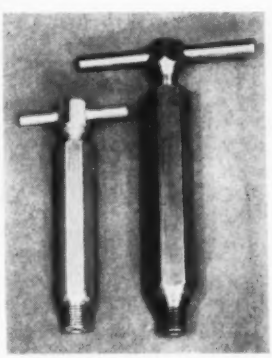
Pre-cut glass tubing

Corning Glass Works offers glass tubing ready to use for hermetically-sealed, all-glass diodes. Manufacturer states that cut-to-length diode components help increase manufacturing efficiency by eliminating the waste and breakage that can occur in transporting, handling, and cutting long tubing lengths. Beads and case diameters are produced to a tolerance of plus or minus 0.002 in. Length tolerances are 0.004 in. on the bead and 0.005 in. on the case. *Corning Glass Works, Corning, N. Y.*

High volume steam cleaners

New Model K line of Kelite steam cleaners (gas or oil fired) have capacities to 300 gal. per hr., with Super Duty models up to 3,000 gal. per hr. Heat exchanger, which traps waste heat, raises water temperature to 100 deg. before water enters main heating circuit—thus reducing fuel consumption. Automotive-type piston pump runs in oil. An automatic device maintains strength of cleaning solution at desired pH. All controls are on front of cabinet. For Bulletin 136 describing new line of steam cleaners, write *Kelite Products, Inc., 1250 N. Main St., Los Angeles 12.*

For pump shaft stuffing boxes



This extension lubricator, previously custom made, is now available as a stock item from manufacturer. It comes in two over-all lengths —6⅜ in. and 8-7/16 N.P.T. thread connector; longer model with larger lubricant barrel is available with either ¼″-18 or ⅜″-18 N.P.T. thread connector. *Meter and Valve Division, Rockwell Manufacturing Co., 400 N. Lexington Ave., Pittsburgh 8, Pa.*

Two new lacquers for metallizing industry

New base coat lacquer, called BC-107, prepares surface of plastic for metallic deposition, and can be force-dried in one hour at 150 deg. F. Top coat, a clear lacquer, called TC-101, is offered as a tough protective coat after metal has been deposited, and will force-dry in about 30 minutes at 150 deg. F. Bottom and top coats can be applied by dipping or spraying and are available in 5-gal. cans and 55-gal. drums. *Schwartz Chemical Co., Inc., 326 W. 70th St., New York, N. Y.*

New industrial line of paint removers

Klean Strip Co. offers five basic chemicals for industrial maintenance: (1) Formula A semi-paste non-inflammable paint remover for heavy industrial jobs, which can be brushed or sprayed and requires no after-wash or neutralizing. (2) Dip Strip, a cold tank stripper, for removing coatings from any type of metal surface by submerging in tank. (3) Metal Treat Concentrate for removing or preventing rust, good on various types of metals. (4) Magic Cleaner, an emulsifier, used for general cleaning of painted surfaces or for degreasing before painting. (5) Spray Gun Kleaner, for removing any type of finishing material from guns and other spray equipment, except rubber hose. *Klean Strip Co., P. O. Box 3565, Memphis, Tenn.*

HELPFUL LITERATURE

FOR YOUR CONVENIENCE the company address follows each item.

Heating units shown

A line of heating units and parts is illustrated and described in a new catalog which includes a complete price list. Write to *Regan Engineering Corp., 1000 S. 24th St., Phoenix, Ariz.*

Electric conductor guide

A 12-page, 2-color manual entitled "A Guide for the Selection of Electric Conductor Accessories" provides information useful for selecting and installing accessories needed with aluminum wires and cables in the construction of overhead electric transmission and distribution lines. *Reynolds Metals Co., 2500 S. Third St., Louisville, Ky.*

Foundry sand data

Automatic proportioning of foundry sand and core binders is explained in a new technical reference, No. 55A. Outlining the various requirements of a typical foundry proportioning operation, the reference presents two methods for meeting these requisites. *Richardson Scale Co., Van Houten Ave., Clifton, N. J.*

Electronic components described

A line of components for electronic control systems is fully illustrated and explained in a new 4-page, 2-color bulletin. Bulletin A1.3-1 gives a brief description of the function and working principles of each unit. *The Swartwout Co., 18511 Euclid Ave., Cleveland 12, Ohio*

Products for rust-proofing

A brochure describing each product of a full line of rust-proofing preservatives is available. Items described are Pennsylvania Refining Co.'s oil, grease, and wax type rust preventive compounds, Orchard Paper Co.'s VPI paper, Shell Oil Co.'s VPI crystals, Bischoff Chemical Corp.'s hot dip plastic strippable protective coatings, and R. M. Hollingshead Corp.'s cocoon sprayable plastic coatings. Write to *J. W. Guthrie Co., 725 Second St., San Francisco.*

How to use felt

A 24-page technical brochure, a felt products design book, describes hundreds of uses of felt with particular emphasis on mechanical applications. The brochure explains the versatility of mechanical or industrial felts and the range of available felt products. *The Felters Co., 210 South St., Boston 11, Mass.*

M-H problems solved

How W. P. Fuller and Co., San Francisco, solved material handling problems peculiar to the paint and varnish industry is explained in the March issue of "Storage Battery Power," published by Edison Storage Battery Division. *Thomas A. Edison, Inc., West Orange, N. J.*

Bulletin describes feeders

A complete line of roll and vanetype feeders and rotary valves designed to handle dry pulverized and granular materials is described in Bulletin F-5. Key dimensions and capacity figures are included. *Fuller Co., Catasauqua, Pa.*

Forging data issued

Advantages of aluminum forgings are discussed in a new 12-page booklet which is completely illustrated. Mechanical properties of aluminum forging alloys are enumerated and typical forging applications summarized. *Harvey Aluminum, 19200 S. Western Ave., Torrance, Calif.*

Motive cranes detailed

Construction details of a complete line of motive cranes are illustrated and described in a new 2-color 24-page brochure. Specifications and outstanding features are also explained and a question-and-answer section discusses the line. *Hughes-Keenan Corp., Box 360, Delaware, Ohio*

Cleaning at room temperature

A 4-page, 2-color folder describes a new line of metal cleaners for use in still tank cleaning installations at room temperatures. *E. F. Houghton and Co., 303 W. Lehigh Ave., Philadelphia, Pa.*

Grits and grinds

Four articles on grinding wheels and grinding machines are included in the contents of the March issue of "Grits and Grinds," a Norton Co. publication. *Norton Co., Worcester 6, Mass.*

Tractor attachments in use

Case histories of a line of job attachments on either new or used tractors is offered in this 16-page, 2-color booklet, "Nine Profitable Minutes for Contractors." Information is given on economies of using tractor tools for profitable fill compacting, trenching, shoveling, pile driving, winching, yarding, bituminous salvage, and other jobs. *Hyster Co., 2902 N. E. Clackamas St., Portland 8, Ore.*

Pickling equipment

A practical guide to pickling operations is offered in a 32-page booklet, "Equipping the Pickle House," which describes the use of specially designed equipment in the processing of large and small fabricated parts, hollowware, and forgings and castings. *International Nickel Co., Inc., 67 Wall St., New York 5, N. Y.*

Metal forming waxes

A line of wax and wax products for metal forming operations is described in a new 2-color, 12-page booklet (485). Included are application descriptions. *S. C. Johnson and Son, Inc., Racine, Wis.*

Belt drives discussed

The first of a series of bi-monthly publications, entitled "Better Drives," deals with drives for heavy-duty belt conveyors. The 4-page, 2-color publication is devoted to the application of power transmission equipment to meet today's industrial needs and will discuss various type drives in succeeding issues. *W. A. Jones Foundry and Machine Co., 4401 W. Roosevelt Rd., Chicago 24, Ill.*

Machining costs cut

How a line of cold finished steel bars makes it possible to cut costs on many parts previously machined economically only from brass is described in a 4-page bulletin, which also offers specifications of the materials. Write to *LaSalle Steel Co., 1412 150th St., Hammond, Ind.*

New shell molding system

An 8-page, 2-color book, No. 2462, explains a fully integrated, automatic shell molding system capable of producing up to 240 quality molds per hour. The new system includes a four-station shell molding machine for forming and curing mold-halves, a shell closing machine for completing the shell-molding operation, and all process equipment from sand preparation to handling of finished castings. *Link-Belt Co., 307 N. Michigan Ave., Chicago 1, Ill.*

HELPFUL LITERATURE

Capacitors listed

A new 78-page catalog divided into several sections completely describes and illustrates a full line of capacitors. The line includes paper dielectric, metallized paper, and polyester film capacitors. Write to *San Fernando Electric Manufacturing Co., 1509 First St., San Fernando, Calif.*

Facilities illustrated

A 48-page booklet illustrates by many photographs the activities of the Allison Steel Manufacturing Co. The company's facilities, outstanding jobs and installations, and products are fully explained. *Allison Steel Manufacturing Co., Phoenix, Ariz.*

Tractor shovel shown

Design, construction, operation, and correct application of 1-cu. yd. Michigan '75' tractor shovels are described in a new 12-page, 2-color catalog. Features for all job requirements are explained, including an all-wheel drive, a front-wheel drive, and a rear-wheel drive. *Clark Equipment Co., Benton Harbor, Mich.*

Chemical price data

Eight pages of material, including an alphabetical list of product names and synonyms, standard containers, prices, and minimum specifications for 36 products, is offered in Arapahoe Chemicals, Inc.'s, new catalog and price list for 1955. Shipping regulations, terms of sale, and a description of distribution policies are also included. *Arapahoe Chemicals, Inc., 2800 Pearl St., Boulder, Colo.*

Tool storage equipment

A new 24-page catalog lists all pertinent information on Lumidor shop equipment including cabinets, benches, stands, drawers, trays, casters, leg extensions, and other items. Write to *Lumidor Manufacturing Co., Inc., 4801 E. 50th St., Los Angeles*

Arizona resources surveyed

Results of a survey of a number of nonmetallic natural resources in Arizona conducted by Arizona Research Consultants, Inc., for the Arizona Development Board are offered in an 85-page report. Complete data on several minerals are listed by counties. *Arizona Development Board, Capitol Annex, Phoenix, Ariz.*

Warehouse capacity increased

How warehouse capacity for a Portland company was increased 400% through the use of fork lift trucks to stack material supplies to the ceiling is explained in Certified Job Study No. 139. The brochure also includes information on speeding up truck and car unloading. *Towmotor Corp., 1226 E. 152nd St., Cleveland 10, Ohio*

Adjustable broaches for keyways

A line of adjustable broaches for production in keyways is explained in a new 4-page, 2-color bulletin (No. 17). Included also are complete specifications, engineering data, and price listings. *The East Shore Machine Products Co., 50 East 201st St., Euclid, Ohio*

New motor featured

The features of a new type electric motor with air intakes so arranged as to prevent intrusion of water or dust, yet allow liberal air flow into the motor for ventilation, are illustrated in a new 12-page, multi-color booklet. *U. S. Electrical Motors Inc., Box 2058, Los Angeles 54*

WHAT is in store at the

Western Plant Maintenance Show and Conference,

Los Angeles, July 12-14?

WHO are the speakers?

. . . see page 48.

WHO are the exhibitors?

. . . see page 49.

WHAT will they exhibit?

. . . see page 84.

Safety for field workers

This new 75-page pocket size field service safety manual serves as a checklist of key points for safe field operations and as a training vehicle for those who fit new men into assignments. Designed for the use of Allis-Chalmers field workers, the booklet is available to all interested readers. *Allis-Chalmers Manufacturing Co., Milwaukee 1, Wis.*

Tubing data compiled

A data folder offers information on use of tubing for elevated temperature or pressure service and a list of ASTM tubing and pipe specifications by number and title. TDC 177 is available from *Tubular Products Division, Babcock and Wilcox Co., Beaver Falls, Pa.*

Lens data

A photographic lens data book lists the pertinent dimensions of 43 lenses for 8 mm., 16 mm., 35 mm., and 9 x 9 in. films. This book will be provided free to personnel active in the design of equipment requiring photographic lenses. Write *Bausch and Lomb Optical Co., 635 St. Paul St., Rochester, N. Y.*

Battery line described

Specifications of C and D PlastiCal batteries and details of their construction are illustrated in new Bulletin CP-536. *C and D Batteries, Inc., Conshohocken, Pa.*

Flat rolled steel

A stock list of flat rolled steel products is offered in a 22-page booklet which includes complete specifications and pertinent data. *The Cold Metal Products Co. of California, 2131 S. Garfield Ave., Los Angeles 22*

Lift equipment

A 34-page, 2-color catalog of industrial lifters, lift trucks, and lift tables gives complete description of each item in the Colson Service line. Photographs, performance data, and new features are included. Write to *Colson Corp., Elyria, Ohio.*

Save time in welding

A new 32-page, 2-color booklet, "DirectoRod Guide" (TIS 1340A), describes over 300 low heat input metal joining applications and procedures. Time and money saving data are included in the text on welding and overlaying all base metals using all heating methods. *Eutectic Welding Alloys Corp., 40 172nd St., Flushing, N. Y.*

HELPFUL LITERATURE

Aluminum processing

A new 80-page book describes process applications of aluminum by industry, presents a directory of the performance of aluminum with various chemicals, and gives the latest information on designing aluminum processing equipment. "Process Industries Applications of Alcoa Aluminum" includes over 100 photos and drawings. Write on company letterhead to *Aluminum Co. of America, 761 Alcoa Bldg., Pittsburgh 19, Pa.*

Builds and insulates

A new 16-page booklet gives complete information on Marinite, a sheet material for building and insulating purposes. "Marinite for Driers, Ovens, Breechings and Housings" presents handling and working recommendations, construction and fabrication suggestions, data on physical and thermal properties, and many photographs of Marinite in use. Write *Johns-Manville, 22 E. 40th St., New York 16.*

Increased tool life

New 8th edition of the Carmet Methods Manual includes information on applications of Allegheny Ludlum steel cutting grades CA-608 and CA-610. Information on increasing carbide tool life and reducing tool costs is also presented. *Allegheny Ludlum Steel Corp., 2020 Oliver Bldg., Pittsburgh 22, Pa.*

Gear reducer data

Design and construction of cooling tower fan drives, a series of spiral bevel gear reducers, are illustrated and detailed in a new bulletin. Company claim important improvements in their new line. *Lufkin Foundry and Machine Co., 5959 S. Alameda St., Los Angeles*

Metal characteristics

The characteristics and applications of a line of cemented hard carbide compositions are explained in a new 2-color, 24-page catalog. Many illustrations show the uses to which this line has been put. Write to *Kennametal Inc., Latrobe, Pa.*

Plant details shown

A new 24-page, 2-color brochure illustrates and gives full details of plant specifications and facilities of the O & M Machine Co. Included are explanations of special production equipment. *O & M Machine Co., 7421 E. Slauson Ave., Los Angeles 22*

Look-up program

A campaign to reduce accident contacts with overhead power lines by farm and industrial equipment offers three illustrated pamphlets emphasizing the need to look up near power lines. Write to *Pacific Gas and Electric Co., 245 Market St., San Francisco 6.*

Plant planning materials

A complete line of equipment for plant layout planning through scale placement of equipment is shown in a new 50-page catalog. Included is an additional 12-page price list indicating prices on the basis of complete jobs, charged for on a square-foot basis, and individual prices of ¼-in. scale models of over 10,000 pieces. *"Visual" Plant Layouts Inc., Pennsylvania Ave. at River, Oakmont, Pa.*

Conveyors shown

A new 16-page catalog shows an entire line of conveying equipment, which includes gravity wheel and roller conveyors and related accessories such as spur curves, hinged sections, diverters, and aluminum sections. *The Rapids-Standard Co., Inc., Grand Rapids 2, Mich.*

Tool centers

A new booklet illustrates a line of antifriction, high speed, and carbide tipped centers. Also included are data on grinder and milling machine dogs, basic bearing designs, interchangeable points for shank centers, and extra heavy duty bull nose and air foil centers. *Ready Tool Co., 554 Iranistan Ave., Bridgeport 5, Conn.*

Lift truck detailed

A 4-ton capacity electric powered fork truck is described in a new 4-page folder. The truck features contactor controls, worm drive, caster trail axle, packaged unit assemblies, rocker arm tilt, low hydraulic pressures, and a protective cowl for the operator. Write to *Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland 3, Ohio.*

Welder arc selector

An 8-page, 2-color bulletin describes the Lincoln Idealarc selector, which provides four types of arc from one welder. These are AC or DC soft arc and AC or DC forceful arc. *Lincoln Electric Co., Cleveland, Ohio*

How to do it

Application instructions for three new Masonite products are offered in new bulletins. Use of the products is well illustrated. *Masonite Corp., 111 W. Washington St., Chicago 2, Ill.*

Variable volume pumps

Utility is stressed in a new 8-page, 2-color bulletin, No. 190, which describes Denison Engineering's new Multipump. Photos of the pumps and their construction are included. *The Denison Engineering Co., Columbus 16, Ohio*

Walkie type lift trucks

A 2-color display-size bulletin pictures the Economy line of Walkie Worklifters in use. Included are drive unit specifications and prices. *Economy Engineering Co., 4511 W. Lake St., Chicago 24*

WESTERNERS AT WORK

CALIFORNIA

McCulloch Motors Corp.

John Woodward *Jack Southwell*
McCulloch Motors Corp.

John Woodward, former factory superintendent, becomes works manager of this Los Angeles company, filling a new executive position. He has been with company for 17 years. *Jack Southwell*, former chief tool engineer, stamping department, succeeds him as factory superintendent. *Cooper Gwin*, who has been acting director of materiel, becomes director of department. *Al Schinnerer* is appointed purchasing agent to succeed Mr. Gwin.

Radioplane Co.

Stuart E. Weaver is elected vice president in charge of engineering for this Van Nuys subsidiary of Northrop Aircraft, Inc. He has served as director of company's weapon systems division since September 1953. *John R. Jacobsen*, former chief engineer, becomes assistant vice president of engineering; and *M. W. Tuttle*, vice president in charge of operations, is placed in charge of all manufacturing.

Pacific Gas and Electric Co.

Norman R. Sutherland is appointed president and general manager of this utility company in San Francisco, succeeding *James B. Black*, who is elevated to chairman of the Board of Directors. Mr. Sutherland was formerly vice president and general manager. *Robert H. Gerdes*, vice president and general counsel, becomes executive vice president and general counsel.

B. F. Goodrich Co.

A. B. Senne becomes Pacific zone credit manager for company's tire and equipment division, with offices in East Los Angeles. He moves from Phoenix, where he was area manager of replacement tire sales for Los Angeles district. Former zone credit manager, *F. S. Morley*, is retiring after 39 years of service for Goodrich.

Petersen Engineering Co.

Robert W. Goode joins this Santa Clara manufacturer of earth-boring equipment in post of works manager. He was formerly general foreman of Be-Ge Manufacturing Co. in Gilroy.

Propulsion Research Corp.

A. V. Finn is elected president of this Santa Monica company which specializes in engineering analysis and design, development, and manufacturing of turbomachinery and propulsion devices.

Raycon Corp.

Turley L. Angle is named assistant general manager of this Belmont manufacturer of high-speed mechanical counters. He was formerly with Ampex Corp. as supervisor of outside manufacturing.

Roylyn, Inc.

Henry F. Thomas is appointed vice president and general manager of this Glendale manufacturer. He joined company in 1953 as assistant general manager and in 1954 was named general manager. *H. G. McIlroy*, one of the three founders of company, resigns.

American Pipe & Steel Corp.

William E. Patton is elected controller and assistant secretary of this Alhambra steel fabricating firm.

Friden Calculating Machine Co., Inc.

Edwin W. Lehtonen becomes chief tool engineer of this San Leandro company, succeeding *William B. Nonamaker*, retired. Mr. Lehtonen has been with Friden since 1952.

E. W. Lehtonen *D. W. Pehl*
Friden Calculating Machine Co., Inc. *Kaiser Steel Corp.*

Kaiser Steel Corp.

Dick W. Pehl is named assistant superintendent of mechanical shops at Fontana plant, a promotion from his former post of general foreman. He has been with Kaiser Steel since 1949.

Hewlett-Packard Co.

Stanton Selby, production engineer for this Palo Alto manufacturer, is promoted to production manager.

Arnold O. Beckman, Inc.

Robert W. Negus is placed in charge of new custom products department of this South Pasadena instrument manufacturer.

R. W. Negus *Gordon Howes*
Arnold O. Beckman, Inc. *Eitel-McCullough, Inc.*

Eitel-McCullough, Inc.

Gordon Howes is named administrative assistant to general manager of this San Bruno electronics firm, stepping up from his former post of director of factory engineering department. *Robert Culbertson* succeeds him in that capacity.

Ampex Corp.

Harold V. Childs is appointed manager, field service engineering department, of this Redwood City manufacturer of magnetic tape recorders. He has been associated heretofore with Motorola Communications and Electronics, Inc., and earlier, with Tracy & Co., Inc., and Western Electric Co.

Clary Corp.

Hubert Manning is named supervisor of precision machine shop by automatic controls division of this San Gabriel manufacturer, and *Frank Grigware* becomes general foreman in charge of assembly operations. Mr. Manning has been a foreman in plant's tool and die department, and Mr. Grigware has been foreman in charge of gyroscope assembly.

Fluor Corp.

John McCoy, who has been supervisor of public relations and editor of employee magazine for this Los Angeles manufacturer since 1949, resigns in order to become director of School of Journalism at University of Southern California.

Food Machinery and Chemical Corp.

Allen G. Hollis is named small business representative for the ordnance division of this San Jose manufacturer. He has been a member of division's procurement staff since April 1953, and previously served with U. S. Department of Commerce and other government agencies on supply and procurement problems.

Consolidated Engineering Corp.

James C. Kyle joins this Pasadena company as technical director of transducer division. He was formerly physicist and research specialist with Ames Aeronautical Laboratory at Moffett Field. *Glyn A. Neff* is named project chief for data processing systems, transferring from company's engineering division.

Convair Division
General Dynamics Corp.

Dr. Charles L. Critchfield, professor of physics at University of Minnesota, joins this San Diego aircraft manufacturer as director of scientific research. *Ralph L. Bayless*, former assistant chief engineer in charge of research, development, and technical sections, becomes chief engineer of San Diego plant. *F. A. Monahan* is appointed manufacturing and development coordinator at Convair-San Diego. He has been with Convair since 1951, last holding position of head of producibility design group in engineering. *Vern Sharp* is new assistant chief plant engineer. He has been with company since 1936, and moves up from post of superintendent of maintenance. *J. W. Vint*, former assistant superintendent, is promoted to maintenance superintendent.

Beckman & Whitley, Inc.

This San Carlos manufacturer appoints three new product managers: *Myron Baldwin*, former test engineer, becomes product manager for research cameras and pressure recorders. *William Place*, former assistant chief engineer, is named product manager for guided missile products. *Ernest Stecker* is new product manager for meteorological instruments and heat-flow transducers.

Joseph R. Greer advances to post of assistant chief engineer from that of project engineer. *George H. Bingham, Jr.*, former chief accountant, is promoted to plant manager.

Lockheed Aircraft Corp.

Dr. Louis N. Ridenour joins Lockheed as director of program development in missile systems division. A former staff member and assistant director of Massachusetts Institute of Technology's radiation laboratory, he most recently served as vice president of International Telemeter Corp., Los Angeles.

G. A. Fitzpatrick moves into newly created post of assistant general manager for California division of this Burbank aircraft manufacturer. He was formerly manufacturing manager. *John A. White* is appointed to another new post, assistant director of materiel, and is succeeded as manager of outside manufacturing by *R. W. Harker*, former purchasing agent. *H. A. Caldwell*, former production manager, steps into post of manufacturing manager vacated by Mr. Fitzpatrick, and is in turn succeeded by *Charles A. Wagner*. *W. A. Pulver* replaces Mr. Wagner as chief manufacturing engineer, and *Robert F. Hurt* takes Mr. Pulver's place as chief tool engineer. Mr. Hurt is succeeded as chief project planner by *W. G. Kibre*.

Leach Corp.

C. R. Harmon resigns as president of this Los Angeles manufacturer, effective July 15, and thereafter will continue in a consulting and advisory capacity. *K. F. Julin*, executive vice president, is appointed general manager.

Packard-Bell Co.

Jean P. Gleis is named vice president of manufacturing for this Los Angeles company.

Pacific Intermountain Express

Henry K. Evans joins this Oakland transport company as special assistant to vice president, operations. For past six years he has been with U. S. Chamber of Commerce in Washington, D. C., serving as highway transportation specialist. *I. W. Shepherd* is appointed director of traffic for P-I-E and its subsidiary, West Coast Fast Freight. Since 1944 he has held that title with the subsidiary organization. *Frank Eardley*, former director of traffic for P-I-E, moves to new position as consultant to sales and traffic division.

Hoffman Electronics Corp.

Leonard A. Mayberry is appointed to newly created position of engineering manager of Hoffman Laboratories, Inc., in Los Angeles; *Gene Lamphear*, former radar group engineer, advances to post of chief electrical engineer; and *John R. Bly* joins firm as director of quality control. Mr. Mayberry last held post of chief engineer for Motorola's military engineering department in Chicago. Mr. Bly's former post was quality control manager for General Controls Co., Glendale.

Western Gear

Bernard J. Bannan, who has been general manager of this Lynwood company's six plants, is elected vice president in charge of operations. *L. A. Myhre*, former assistant general manager in charge of marketing, becomes vice president in charge of marketing. *Paul Mehren* moves up from post of controller to that of secretary-controller.

WESTERNERS AT WORK

Industrial Planning Associates

Harold V. Pederson becomes regional director of this recently re-named San Francisco firm (formerly Industrial Survey Associates) headed by Stuart Parry Walsh. A Washington, D. C., office has been opened, with *Edmund H. Robertson* moving over from the Chamber of Commerce of the U. S. to manage it.

Westinghouse Electric Corp.

H. Ward Hahir, manager of engineering for Naval Ordnance project at company's Sunnyvale plant, receives Westinghouse Order of Merit for significant technical contributions to development of an anti-aircraft gun for shipboard use. Mr. Hahir started with the Navy project as a consulting engineer in 1945 in the Sunyvale plant, then operated by Joshua Hendy Iron Works.

Container Corp. of America

Clint Eastwood of company's Seattle plant is promoted to general manager of Oakland plant. *Ray Van Saun*, manager at Portland, takes over Mr. Eastwood's former post temporarily.

Interstate Engineering Corp.

James S. Gallagher becomes executive vice president for this El Segundo manufacturer of precision parts.

Central Eureka Corp.

Donald D. Smith is elected president of this San Jose company, succeeding *H. J. McPherson*, resigned. Mr. McPherson, who continues as member of board, will now head Interstate Chemical Co. of Santa Clara.

COLORADO

Colorado Milling and Elevator Co.

Robert M. Pease is elected president of this Denver company, succeeding *Fred W. Lake*, who moves up to newly created office of chairman of the board. *George M. Hopfenbeck*, chief financial officer of company since 1944, is named senior vice president and treasurer. *J. Lawson Cook* is promoted from assistant vice president to vice president.

NEVADA

Kennecott Copper Corp.

Frank G. Woodruff, former safety director for company's Nevada mines division, advances to post of general superintendent of reduction plant at McGill. *Rush Muse* moves up to post of pit general foreman from that of mines industrial engineer. *Frank Quilici* is placed in charge of operations at Nevada mines division's Liberty and Veteran pits. He was formerly with Isbell Construction Co. of Reno, since 1949 as superintendent of operations in Ely area.

OREGON

Clyde Tube Forgings of America, Inc.

Jay S. Case is appointed vice president in charge of production of this new Portland manufacturer. He joins the company after eight years with Tube-Turns of Louisville, Ky., a division of National Cylinder Gas Co. of Chicago.

J. S. Case
Clyde Tube Forgings

F. M. Hughes
Forest Fiber Products Co.

Forest Fiber Products Co.

F. M. Hughes becomes manager of production and sales of this Forest Grove hardboard manufacturer, moving up from post of hardboard sales service manager.

Reynolds Metals Co.

E. J. Appel, general manager of Western reduction division, advances to manager of facilities development of company's reduction division, with headquarters in Richmond, Va.

Crown Zellerbach Corp.

Frank A. Drumb, assistant vice president of this forest products company in Portland, is elected president of a Canadian affiliate, Canadian Western Lumber Co., near Vancouver, B. C. *John M. Fulton*, director of purchases for Crown Zellerbach Corp., with headquarters in Portland, also takes over Mr. Drumb's former duties.

Portland General Electric Co.

James H. Polhemus retires as president of this utility company. *Thomas W. Delzell*, board chairman, is elected as executive head of company, and *Frank M. Warren, Jr.*, executive vice president, moves up to president. Mr. Warren joined company in 1937, became a vice president in 1942, and in 1947 was elected executive vice president.

UTAH

Kennecott Copper Corp.

A. L. Pratt is appointed division traffic manager for Utah copper division in company's Salt Lake City offices, succeeding *Franklin B. Merrill*, deceased. Mr. Pratt was formerly assistant to Mr. Merrill. *Carl Jensen* is named plant engineer, department of mills, succeeding *George A. Parker*, who has retired following 32 years of service. Mr. Jensen has served as designer and assistant plant engineer.

WASHINGTON

Weyerhaeuser Timber Co.

Dr. W. I. Patnode
Weyerhaeuser
Timber Co.

Dr. Winton I. Patnode joins company's general offices in Tacoma, where he will assist in directing firm's research and development program. He comes to Weyerhaeuser after 24 years with General Electric Co., most recently as a management executive with Hanford Atomic Products Operation at Richland. *R. E. Baker* is named to new post of manager of manufacturing for pulp division, with headquarters at Tacoma. He is succeeded as Longview pulp division manager by *E. N. Wennberg*, former superintendent of paperboard manufacturing at Longview.

Robertshaw-Fulton Controls Co.

Herbert W. Witt is appointed field engineer in Seattle area for aeronautical division of this California company. Prior to joining company, he was senior facilities engineer for Boeing Airplane Co. and has also served as appraisal engineer with U. S. Appraisal Co., Seattle.

St. Regis Paper Co.

John A. McDermott becomes supervisor of all paper mills for this company. *Sidney T. Dolan* is named Tacoma mill superintendent, succeeding *John M. Victor*, who has been transferred to Jacksonville, Fla., as mill general superintendent.

ASSOCIATIONS ELECT

American Institute of Industrial Engineers:

President, *Ed Slagle*, chief works industrial engineer, Pittsburg mill, Columbia-Geneva Division, U. S. Steel Corp.; Western regional vice president, *Professor Grant Ireson*, Stanford University.

American Institute of Industrial Engineers (Peninsula Chapter):

President, *Lee Conton*, plant industrial engineer, National Motor Bearing Co., Inc.; vice president, *Robert Parden*, dean of engineering, Santa Clara University; secretary, *Richard Houk*, manager of industrial engineering, United Air Lines; treasurer, *Alvin Colburn*, Libby McNeill & Libby.

Purchasing Agents' Assoc.:

President, *C. T. Hofmeister*, Standard Oil Co. of Calif., San Francisco; 1st vice president, *Lewis G. Baker*, University of California, Berkeley; 2d vice president, *O. B. Sundberg*, Hewlett-Packard Co., Palo Alto; secretary, *C. A. Dalen*, Castle & Cooke Ltd., San Francisco; treasurer, *Frank E. Baxter*, Pacific Gas and Electric Co., San Francisco.

American Warehousemen's Assoc.:

President, *I. S. Culver*, president of Gibraltar Warehouses, San Francisco; vice president, *M. W. Young*, vice president and general manager of National Ice and Cold Storage Co. of Calif., San Francisco.

American Society of Mechanical Engineers (Southern California Section):

Chairman, *R. M. Hatfield*, Combustion Engineering, Inc.; vice chairman, *F. J. Fontana*, Richfield Oil Corp.; secretary-treasurer, *Shuman H. Moore*, Foster-Wheeler Corp.

Assoc. of California Testing and Inspection Laboratories:

President, *Frank R. Killinger*, A. J. Hales & Co., Oakland; vice president, *Raymond G. Osborn, Jr.*, Raymond G. Osborn Co., Los Angeles; secretary-treasurer, *Howard Dunn*, Hersey Inspection Bureau, Oakland.

American Council of Commercial Laboratories, Inc. (Western Division):

Chairman, *Claude McLean*, Arizona Testing Laboratories, Phoenix; vice chairman, *Francis Owens*, Laucks Laboratories, Seattle; secretary-treasurer, *Michael Sullivan*, Valley Laboratories, Phoenix.

Society of Plastics Engineers (Pacific Northwest Section):

President, *Marvin E. Carr*, Glass Fiber and Plastics Supply; vice president, *Berton A. Cole*, Boeing Airplane Co.; secretary, *R. A. Fulton*, Wilson and Geo. Meyer and Co.; treasurer, *Bruce Stewart*, Stewart Machine Works.

Concrete Masonry Assoc.:

President *E. L. Chaffee*, O'Kelley-Eccles Co., Baldwin Park, Calif.; vice president, *Pete Muth*, Orco Block Co., Stanton, Calif.; secretary, *H. C. Shirley*, Superior Concrete Block and Building Supply Co., Temple City, Calif.; treasurer, *Roy Beal*, Roy Beal, Inc., El Monte, Calif.

TRADE WINDS

New Dempster dealer

Dempster Brothers, Inc., appoints Schultz Materials Handling Corp., San Francisco, as its new dealer to handle the company's business in the Bay Area.

New Western outlet

Stryco Sales, Inc., Albuquerque, is new Western representative in Arizona and New Mexico for Automatic Transportation Co., Chicago. Firm is headed by Roy Stryker.

LeTourneau appoints Morris

Stanley E. Morris Co. of Los Angeles is new distributor of LeTourneau electric hoists and jib cranes in the Southern California area. Distributor firm will carry supply of the full line and maintain parts and service facilities.

New Shell appointments

Shell Chemical Corp. names J. P. Cunningham manager of new Los Angeles marketing division to handle sale of synthetic rubber and J. E. Toevs sales manager for the new division. Mr. Cunningham was former manager of company's product development department in New York. Mr. Toevs was district chemical sales manager in Los Angeles.

Moving up

Sterling Electric Motors, Inc., Los Angeles, promotes John R. Howell to vice president in charge of sales. He was company's sales manager.

Kelite reorganizes

W. G. Nuelsen *L. C. Sorensen*
Kelite Corporation

Kelite Products, Inc., integrates several corporations throughout the country as Kelite Corp., formed in California. L. C. Sorensen, Kelite founder, is president of new corporation, and W. G. Nuelsen, former president of the Illinois Kelite unit, is new senior vice president. Firm will headquarter in Los Angeles.

New line

Bearing Engineering and Supply Co., Seattle, Wash., receives appointment as stocking distributors of Randall Graphite Bearings, Inc., line, which includes self-aligning sleeve bearing pillow blocks, deep well ball assemblies, flange units, bearing brackets, grommets, and washers. New distributor will handle sales and supply in Washington and Alaska.

Forms own firm

Gordon M. Jackson, former vice president of Drayer-Hanson, Inc., forms new engineering firm in East Los Angeles under name of G. M. Jackson and Co. The firm will offer a wide range of heat exchangers, shell and finned tube condensers and reboilers, aerial coolers, atmospheric sections, and evaporative coolers.

Fairbanks-Morse changes

John C. Elmburg, former manager of Fairbanks, Morse and Co.'s Portland, Ore., office, is appointed assistant general sales manager of the Chicago firm. He is succeeded in Portland by William F. Wahlenmaier, former electrical department manager.

Appoint Western unit

Brooks and Perkins, Inc., Detroit, Mich., appoints Continental Metals, Inc., of Los Angeles as representatives and warehouse distributors of firm's magnesium mill products. Most standard gages in mill sizes will be available.

Brainard appoints Evju

Evju Products Co., Inc., San Francisco, is new representative in Northern California area for Brainard Steel Co. of Warren, Ohio, and will handle sales of pallet racks for storage systems.

New gear division

The U. S. A. Pacific Branch in Oakland, Calif., of David Brown Ltd. of Canada establishes new gear division in Oakland. Stuart Walters, former sales representative in Montreal, Canada, is new Western gear division's sales manager.

Stuart Walters
David Brown, Ltd.
of Canada

W. H. Curtiss, Jr.
Owens-Corning
Fiberglas Corp.

Sales Manager Curtis

Owens-Corning Fiberglas Corp., Toledo, Ohio, appoints William H. Curtiss, Jr., to post of general sales manager of its Pacific Coast division. Mr. Curtiss was formerly sales manager for company's textile products on the Pacific Coast, and will continue to head this phase of activity. E. D. Herron, who held post of sales manager up to now, resigns to become general sales manager of Commodore Industries, Redwood City, Calif.

Appoint Ets-Hokin and Galvan

Ets-Hokin and Galvan, San Francisco, is new Presto Recording Corp. distributor in Northern California area. Presto manufactures commercial and industrial recording equipment.

New apparatus division

Westinghouse Electric Corp., Pittsburgh, Pa., designates the Salt Lake City apparatus territory as Intermountain district headquarters. H. B. Hodgins, branch manager there since 1949, is now manager of the newly formed district.

Clark Controller names Globe

Globe Electric Supply Co., Seattle, Wash., is new distributor for Clark Controller Co., Cleveland, Ohio. Firm will handle push buttons, relays, contactors, starters, and related equipment.

New service for Pacific Wood Tank

Pennsylvania Salt Manufacturing Co. of Philadelphia appoints Pacific Wood Tank Corp. of San Francisco as representative in Northern California and Western Nevada area. New distributor will handle chemical resistant cements, linings, and coatings.

Celebrate 25th year

Irving G. King Co., Los Angeles, observes 25th anniversary in April with party at Altadena, Calif., for employees, their families, and old company friends.

Turco-McKenna sales plan

Turco Products, Inc., Los Angeles, and McKenna Laboratories, Santa Monica, sign agreement making Turco national distributor for McKenna ultrasonic cleaning equipment.

Oliver Corp. directors meet

Oliver Corp., Chicago, holds annual directors meeting at Gilroy, Calif., plant of Be-Ge Manufacturing Co. an Oliver subsidiary. The meeting included a three-day open house and several showings of the Oliver line of equipment.

Peerless Pump appoints two

Peerless Pump division of Food Machinery and Chemical Corp., Los Angeles, appoints Carl L. Nickel as product sales manager, water systems and dealer-line products. Norman C. Olson is appointed product sales manager of engineered line products. Both men formerly served in Chicago offices.

Western Gear opens in East

Western Gear of Lynwood, Calif., opens an eastern application engineering office in Washington, D. C. Office will provide engineering information and service on the Western Gear line of products.

Fibreboard appoints Renderer

B. L. Renderer is new manager of beverage packaging sales for Fibreboard Products, Inc. Formerly in the company's Seattle sales office, he will move to San Francisco head office in his new position.

TRADE WINDS

Caine Steel appoints Locke

Caine Steel Co. of California names E. E. Locke as sales manager of its Los Angeles warehouse division. He will coordinate sales of the company's flat-rolled products and its roll-forming division.

Hoffman appoints Bush

Hoffman Laboratories, Inc., Los Angeles, appoints William R. Bush to new post of assistant general sales manager. He was former staff assistant to the Chief of Naval Research as special devices center liaison.

New Deming representative

Dexter F. Anderson is new Western representative for the Deming Co., Salem, Ohio, manufacturer of pumps and water systems. He succeeds Wade Burlingame, retired. Mr. Anderson was formerly associated with a Deming distributor in the Middle West, handling pump and mill supply sales.

Alden-Snyder merger

Alden Equipment Co., Los Angeles, acquires Snyder Engineering Corp., assuming all assets and liabilities of that firm. All Snyder personnel will be retained.

Buys Commonwealth Steel

Howard Supply Co., Los Angeles, acquires Commonwealth Steel and Supply Co., distributor of steel, nails, wire, and fasteners. The supply company will now have a total of 13 warehouses in California.

New facilities for Brookes Co.

E. Jordan Brookes Co., San Francisco, moves to new warehouse and sales offices at 571 Howard St., San Francisco. Stock includes beryllium, copper, nylon, telflon, aluminum, and copper tubing, perforated metals, and brazing alloys.

Changes name

Rapids-Standard Co., Inc., of California, located in San Francisco, changes name to Rapistan of California, Inc. Firm is distributor of Rapistan line of gravity and power belt conveyors, casters, hand trucks, and portable lift equipment.

Moving West

Arthur D. Crino, an application engineer in Allis-Chalmers Manufacturing Co.'s switchgear department since 1953, becomes sales representative in company's Seattle district office.

Open office in West

Electric Controller and Manufacturing Co., Cleveland, Ohio, opens Western offices in San Carlos, Calif. John L. King, formerly with T. R. Routh Co., will head the new operation.

New Western outlets

Equipment Engineering Co., Minneapolis, appoints Thomas Hood, Hood Engineering Sales Co., San Francisco, and Walter S. Eschbach of Sierra Industries, Inc., Los Angeles, as Northern and Southern California area representatives, respectively, for variable speed mechanisms.

Sales manager Bermingham

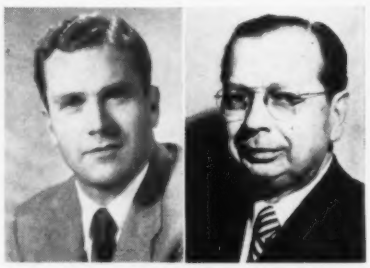
E. F. Houghton and Co., Philadelphia, Pa., appoints John Bermingham its Western sales manager with headquarters in San Francisco. He was formerly a sales representative for the firm. In his new position he replaces W. A. Fletcher, deceased.

Consolidated Engineering changes

Consolidated Engineering Corp., Pasadena, Calif., and its subsidiary, Consolidated Vacuum Corp., Rochester, N. Y., merge sales and service functions. All field sales and service personnel will now represent products of both firms, although certain representatives will specialize in a particular product.

Sales manager Schumacher

Bethlehem Pacific Coast Steel Corp. appoints Roy F. Schumacher, former sales engineer in Los Angeles district offices, to position of manager of sheet and tin plate sales. His new offices will be in San Francisco.



R. F. Schumacher
Bethlehem Pacific Coast Steel Corp.

F. F. Roehll
Eutectic Welding Alloys Corp.

New welding service

Gordon Duff, Inc., Los Angeles, sets up a special Eutectic Welding service department to show foremen and welders the newest techniques for saving on maintenance welding. Fred F. Roehll, Eutectic Co.'s vice president, who is in charge of Eutectic's distributor program on West Coast, has moved his headquarters from New York to San Gabriel, Calif.

Armco moves Murray

W. T. Murray moves from Armco Drainage and Metal Products Co.'s Berkeley, Calif., operation to take charge of new Armco operation at Phoenix, Ariz.

New socket screw specialist

Bristol Co., Waterbury, Conn., appoints D. J. Yates as socket screw field representative for Southern California, with offices in Los Angeles. He was formerly company's representative in the Pittsburgh, Pa., area.

Tucker joins Cummins

John W. Tucker joins the field sales staff of Cummins Engine Co., Inc., as Los Angeles regional representative. He succeeds J. P. Jung, who moves to the company's southeastern region. Home office of Cummins is Columbus, Ind.

Expand product lines

Washington Belting and Rubber Co. of Seattle adds the products of Hewitt Industrial Rubber division of Hewitt-Robins, Inc. Distributor firm also has offices in Tacoma and Everett.

CLASSIFIED SECTION

Space is sold as advertisers' inches. All advertisements in this section are ⅛ inch short of contracted space to allow for borders and composition. Rates are $7.50 a column inch. Copy should be sent in by the 25th of preceding month if proofs are required; by the 28th if no proofs are required.

Atkins Saw managers

John G. Deutsch, former sales manager for Acme Industrial Supply Co., is new Western industrial division manager for Atkins Saw Division of Borg-Warner Corp., with headquarters in Los Angeles. W. H. Brace is promoted in Portland offices to Northwest industrial division manager, and W. M. Barber is appointed industrial sales representative in Northern Oregon with offices in Portland.

Expand sales service

Cyril D. Oberg is named manager of aircraft and engine component sales, and William F. Cords is appointed his assistant, for Solar Aircraft Co., of San Diego, where both men will headquarter. Kent M. Campbell, former manager of Solar's southwest office in Fort Worth, Tex., heads the company's new special product sales department.

Metallurgist joins Pyromet

Robert L. Ray, former alloy and stainless steel specialist for Joseph T. Ryerson & Son, Inc., at Emeryville, Calif., joins Pyromet Brazing and Heat Treating Co., South San Francisco, as sales manager.

From LA to SF

Westinghouse Electric Corp. moves Morris P. Buswell, area sales manager of the apparatus division for Westinghouse in Los Angeles since 1950, to a similar post in San Francisco. Included in his new territory is Hawaii.

Regional manager Murphey

Randy J. Murphey is new regional manager in Northern California for Granberg Corp., pump manufacturers of Oakland, where he will headquarter.

New Clark representative

N. A. D'Arcy
Clark Equipment Co.

Nicholas A. D'Arcy, Huntington Park, Calif., is new factory representative for Clark Equipment Co., Mich. He will handle the Clark line in San Luis Obispo, Kings, Tulare, and Inyo counties in Southern California.

New lines for J. W. Guthrie Co.

J. W. Guthrie Co. of San Francisco, with offices and warehouses in Los Angeles and distributors in Seattle and Salt Lake City, adds five firms' products to its line of government specification and commercial preservation items. Firm will now handle oil, grease, and wax type rust preventives for Pennsylvania Refining Co., VPI paper for Orchard Paper Co., VPI crystals for Shell Oil Co., hot dip plastic strippable protective coatings for Bischoff Chemical Corp., and cocoon sprayable plastic coatings for R. M. Hollingshead Corp.

Add Northern California

Brumley-Donaldson Co., Los Angeles and Oakland, sales representative in Southern California for the Detroit Electric Furnace division of Kuhlman Electric Co., of Michigan, now serves the entire state by adding Northern California to its service area.

Reynolds aluminum pipe

Reynolds Metals Co. appoints Perry Kilsby Inc., Los Angeles, as distributor of Reynolds aluminum pipe and tubing. Perry Kilsby maintains branch offices in the West in Salt Lake City, Seattle, San Francisco, and Albuquerque.

Adalet appoints Curry

Adalet Manufacturing Co., Cleveland, names Curry Co. of San Francisco, headed by Michael Curry, as Northern California representative for their conduit fittings, vapor-type lighting fixtures, and other lines.

Sales Engineer Henry

Harold Henry, Los Angeles, is new sales engineer for the DV Controls division of Engineered Instruments, Inc., Hayward, Calif., and will serve the greater Los Angeles area.

Pick Gorsey

Leo M. Gorsey moves up in Utility Fan Corp., Los Angeles, from blower and cooler engineering head to sales engineer for California.

UNITED STATES STEEL AT WORK IN THE WEST—3-man sales team serves steel customers

YOU GET ANSWERS FAST by men who know your needs

How often have you heard, *"Sorry, the man who services your account isn't in"*? This exasperating experience just doesn't happen to U. S. Steel customers. Backing up each USS salesman are two "inside" representatives who know your products and your requirements. They are available throughout the day to give you fast, efficient service. This is the kind of service you have a right to expect when buying steel . . . *United States Steel.*

Yesterday, Today, and Tomorrow—Columbia-Geneva has for years helped to fill the steel needs of the West. We hope that when you need steel, you'll continue to look first to Columbia-Geneva, Western producing member of the industrial family that serves the nation—United States Steel.

West's Largest Steel Producer

United States Steel Corporation • Columbia-Geneva Steel Division

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THE West ON ITS WAY

NEW PLANTS, EXPANSIONS, NEW INDUSTRIES, PRODUCTION CONTRACTS, DEVELOPMENT PROJECTS, UTILIZATION OF RESOURCES

● A regular section of WESTERN INDUSTRY, 609 Mission Street, San Francisco 5 ●

INDUSTRIAL HIGHLIGHTS

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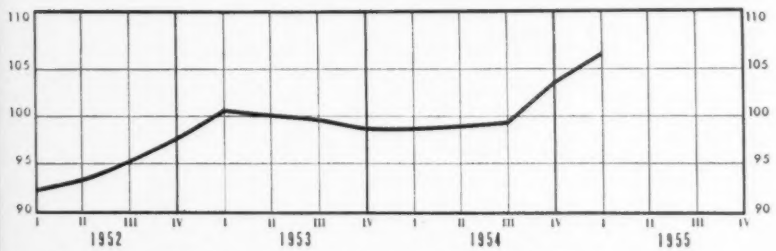

Prudential publishes first business index of 11 Western states

BUSINESS INDEX above, published by the Western home office of the Prudential Insurance Co. of America, is the first to include activities of the entire business West. Overall Western business activity rose 3.5% during the first quarter of 1955 over the level of 1954's fourth quarter. The index represents a weighted average of 16 seasonally adjusted activities: farm marketings—5; petroleum output—3; copper output—1; building permits—4; engineering contracts—3; manufacturing payrolls—20; lumber production—2; retail sales—19; business loans—4; ordinary life insurance sales—3; non-farm mortgages—2; gasoline sales—5; electric energy—3; carloadings—2; service employment—10; government employment—14.

Thunderbird Chemicals, Inc., new $13,000,000 Arizona firm (p. 117)

Kaiser Gypsum plans $5,000,000 Northern California plant (p. 117)

Crown Zellerbach to build 22-story San Francisco offices (p. 118)

Stanley Aviation, Buffalo, N. Y., moves to Denver (p. 122)

Ideal Cement plans $6,000,000 addition in Montana (p. 122)

ARIZONA

CHEMICAL PLANT AT KYRENE—Thunderbird Chemicals, Inc., new Arizona corporation, plans a $13,000,000 agricultural and industrial chemical plant on 122-acre site acquired from Salt River Power District in Kyrene, near Phoenix. Engineering and design work is underway by Ebasco Services, Inc., New York, and plant is scheduled to be in production by June 1956, employing about 125 men.

NEW TOOL FIRM IN PHOENIX—Precision Products Inc. leases 1,500-sq. ft. building in Phoenix for tool and die manufacturing operations which will employ about 12 skilled workers. Officers of new firm are Alexander Root, president; Roy Wilkinson, vice president; and John Serafin, secretary-treasurer.

SPUR ELECTRONICS RESEARCH — Brig. Gen. Emil Lenzner, commanding officer of Fort Huachuca Army Electronics Proving Ground, announces that new contracts valued at $20 to $30 million for development of electronic equipment will be awarded by the research center to private industry during fiscal year beginning July 1, 1955.

NEW MOTOROLA PLANT — Construction of $1,500,000 plant for Motorola, Inc., begins on 18-acre site in Phoenix. Plant, which will be used for research, development, and production of transistor tubes, employing from 300 to 500 technical personnel at the start, is scheduled for completion early next year.

BRITISH COLUMBIA

STEEL INDUSTRY AHEAD—Waller interests of England and Canada plan to establish steel plant with capacity of 50,000 tons per year as first step in development of a steel industry in British Columbia. Eventual output from smelter and rolling mills to be built over a seven-year period is anticipated at 1,000,000 tons annually. Cement manufacturing plant is now under construction at Chilliwack, B. C., for Waller companies, to cost $7,000,000 and to begin operation in about a year.

LENKURT BUILDS IN CANADA — Lenkurt Electric Co. of Canada, Ltd., subsidiary of Lenkurt Electric Co. of San Carlos, Calif., begins work on new $200,000 factory and office building in Burnaby, near Vancouver, to be completed early next year. Company, which produces carrier telephone and telegraph equipment and microwave systems, will move its operations from present plant in Vancouver to Barnaby facility.

CALIFORNIA

PITTSBURG PLANT FOR KAISER GYPSUM—$5,000,000 gypsum board plant and plaster mill will be built on 72-acre site in Pittsburg for Kaiser Gypsum Co., Inc., with work to begin before July and to be completed in about one year. New plant will have annual production capacity of 180,000,000 sq. ft. of gypsum board products and 20,000 tons of plaster and will employ about 180 persons. Facilities will include six main buildings and dock and turning basin for ocean-going ore vessels delivering raw gypsum ore from Kaiser Gypsum's quarries on San Marcos Island, Lower California.

NAPA PLANT FOR KAISER—Kaiser Steel Corp. acquires two plants of Steel Division of Basalt Rock Co., one located at Napa (above), reported to be the largest producer of large diameter steel line pipe in West, which contains a 4-drydock shipyard and facilities for producing a variety of fabricated steel products; the other at Fontana. Multi-million dollar transaction is subject to approval of stockholders of Basalt Rock Co., which will continue its other operations in field of concrete aggregates, Basalite, and building materials. Kaiser recently purchased former Union Steel Co. fabricating plant in Los Angeles.

PLAN OFFICE BUILDING — Crown Zellerbach Corp. will build a 22-floor headquarters office building in downtown San Francisco next year, with occupancy scheduled for mid-1958. Company plans to use about 40% of building's office space at start, offering the remainder for rental. Building will cover rectangular area of 13,000 sq. ft., surrounded by 20,000 sq. ft. of landscaped gardens. Underground two-level garage will hold over 200 cars. Two architectural firms, Hertzka and Knowles, and Skidmore, Owings and Merrill, are associated in planning building.

PROGRESS REPORT—New company, Petro-Tex Chemical Corp., is formed by Food Machinery and Chemical Corp., San Jose, and Tennessee Gas Transmission Co. to operate 90,000-ton butadiene plant at Houston, Tex., recently purchased by FMC from the government. Stockholders of Chiksan Co. approve exchange of stock proposed by FMC, which now adds through the merger a plant in Brea and another at Houston, Tex.

DECOTO INDUSTRIAL SITE—Southern Pacific Co. buys 222-acre tract near Decoto, in southern Alameda County, at reported cost of about $1,000,000, and will hold the land for future development as an industrial area.

RESDEL MOVES—Resdel Engineering Corp., Los Angeles, moves to 21,000-sq. ft. building in Pasadena which provides ten times its original plant capacity, for expanded production of radar systems and industrial dielectric heaters.

CHANGES AT PERMANENTE—Permanente Cement Co. will add sixth rotary kiln and related equipment at its Permanente plant to increase capacity by 20%, boosting total design output to 8,400,000 bbl. annually. Estimated cost is about $4,000,000. Facilities, which are being designed by Kaiser Engineers, are scheduled to begin operation by mid-1956.

OPEN TORRANCE OFFICES—Sheridan-Gray Inc., design and development division of T. W. & C. B. Sheridan Co. of New York, occupies new one-story building near Torrance Municipal Airport. Parent company manufactures printing and binding equipment, and designs and builds specialized aircraft manufacturing equipment.

ENGINEERING TEST REACTOR — Team of specialists from the Atomic Energy division of Kaiser Engineers begin work on the design of an engineering test reactor. Reactor will be used to test high radiation fields, materials related to the development of cores, fuel assemblies, and other components of reactor projects. Certain specialized phases of the nuclear design will be accomplished through the services of General Electric Co.

AIRCRAFT ASSEMBLIES PURCHASE —Ronson Corp. acquires Hydraulic Units, Inc., Pasadena manufacturers of aircraft assemblies. This is part of Ronson's diversification and expansion program.

FOURTH EXPANSION — Canoga Corp., Van Nuys, plans to add 65,000 sq. ft. of floor space to its present plant, including a new building to house electronic and microwave engineering departments. This will be fourth expansion in three years for company.

PACKER PURCHASE — Workman Packing Co. of San Leandro is acquired by investment group headed by Lawrence G. Stark, who was formerly with American Home Foods. H. P. Heubner is vice president.

BUY SITE FOR EXPANSION—Nutrilite Products Co. of Buena Park buys 48-acre site in Santa Ana for construction of new plant facilities. Eventually operations will be transferred from Buena Park to Santa Ana.

FORD HONORED — Donn Sigerson (left), president of Allwork Manufacturing Co. of Oakland, presents scroll to Henry Ford II (right), on occasion of dedication of new Ford assembly plant at Milpitas, in appreciation of Ford Motor Co.'s Western procurement program. Mr. Sigerson represented a group of small businessmen in Northern California who have participated in Ford's purchasing program, begun in 1947. Company reportedly buys $50,000,000 worth of parts from California manufacturers each year.

BUYS CANNING COMPANY—Penrose Russell, previously plant superintendent of Western California Canners, and Larry Huntington, formerly with Hickmott operation, buy Hickmott Canning Co., Antioch.

NEW ELECTRONICS FIRM—Autron Engineering, Inc., is organized in Los Angeles, for design and development of electronic and electromechanical controls for industry.

DALMO VICTOR WILL BUILD—New $1,200,000 180,000-sq. ft. plant will be built by Dalmo Victor Co., San Carlos, on 10-acre site in Belmont—reportedly largest single-unit manufacturing plant on the Peninsula. Plant will be completed next summer. Company is a wholly-owned subsidiary of Textron American, Inc.

CORNELL-DUBILIER—Bronze bust of Dr. Robert Millikan is presented to Dr. Lee DuBridge (right), president of California Institute of Technology, in ceremonies celebrating 45th anniversary of Cornell-Dubilier Electric Corp. and opening of company's West Coast division electronics plant in Venice. Others above (left to right) are: Dr. A. O. Beckman, electronics executive; William Dubilier, company founder; and Octave Blake, president of Cornell-Dubilier.

It's that extra something that makes the difference

. . . in clovers . . . and in carriers

That difference can spell more profits for you . . . in time and economy when you ship the National way!

You'll *see* the difference when you ship your less-than-carload freight via National Carloading Corporation. Our service has kept pace with the growth of industry in the west . . . equated available shipping facilities with the needs of the individual shipper!

There was a time when western shippers had to take pot-luck – they kissed their goods good-bye and hoped for early delivery . . . if they were lucky. Then along came the carrier with the *difference* . . . National. Our 150 station network covers the country . . . serves as a strong link between East and West in either direction.

When you ship via National, you're assured of the fastest and most direct route. . . . And since National shoulders the complete responsibility for the entire shipment from door-to-door, there's only *one* call to make, giving you easy tracing and making reconsignment and diversion possible enroute . . . a package service designed for the West!

There *is* a difference when you ship via National. Our reputation throughout the country is proof of dependable service.

WRITE FOR NATIONAL NEWS . . . our monthly publication that keeps you informed of the latest developments in National's ever-expanding service in tying the East and West together, faster and more economically. You'll find it packed with useful information. No obligation, of course.

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Pacific Coast Division Headquarters: 354 S. Spring St., Los Angeles, Cal., Trinity 8421
District Office: 6625 White-Henry-Stuart Bldg., Seattle, Wash., Mutual 1490
District Office: 245 California St., San Francisco, Cal., Garfield 1-6279

NO. 3 IN LOS ANGELES—New plant of Container Corp. of America at 2601 S. Malt Ave., Los Angeles, begins production of corrugated and fiber shipping containers. This is company's third plant in Los Angeles area. Production capacity of 4,000,000 sq. ft. per day makes it the largest of Container Corp.'s 18 container producing plants.

NEW PAINT LAB—Wilson Research Laboratory of Harlan Associates is opened in Los Angeles, under the direction of Francis K. Wilson, and will specialize in investigations of coating failures, preparation of paint specifications, and other inspection, testing and development work on problems of paint and plastics industries.

HEADQUARTERS FOR P-I-E—Pacific Intermountain Express buys 10-acre site in Orinda, near Oakland, for construction of $750,000 administration office building.

WAREHOUSE PROJECT — Southern Pacific Co. adds warehouses at San Francisco. Buildings are of rigid frame steel construction, using structurals fabricated by Butler Manufacturing Co. from plate and sheet supplied by Kaiser Steel.

WORKING OUT MERGER—Officials of Byron Jackson Co., Vernon, and Borg-Warner Corp., Chicago, reach agreement on merger of two companies, subject to approval of boards of directors. Byron Jackson, manufacturer of centrifugal pumps, oil field tools, electronic devices, and nuclear power components, would continue to operate as an independent unit under present management.

NEW FIELD FOR HALL-SCOTT—Hall-Scott Motors Co., Berkeley, acquires Bardwell and McAlister, Burbank company specializing in electronics for guided missiles, radar, and atomic energy program.

INSTRUMENT FIRMS MERGE—Ideal Laboratory Tool and Supply Co. of Cheyenne, Wyo., and Aerosmith Instrument Co. of Hawthorne, Calif., merge under new name of Ideal-Aerosmith, Inc. Both plants will continue in operation; major production of standard items will be concentrated at Hawthorne, and Cheyenne facility will handle special orders as well as experimental engineering and new product development. Equipment manufactured is in field of aircraft instrumentation, and pressure and rate-of-motion measurement.

CONSOLIDATE — Mag-Electric Products, Inc., Hawthorne, acquires assets of Mag-Electric Networks, Inc., Hawthorne. Operations will be consolidated in plant of purchasing company.

CANADA-BOUND—Bulk-loading facility of Port of Long Beach loads 7,000 tons of petroleum coke produced in Southern California onto S. S. Wilford for shipment to Kitimat smelters of Aluminum Co. of Canada. First of these shipments to Kitimat from Port of Long Beach was made in May.

EXPAND MICROWAVE LAB—General Electric Co. will double size of its microwave research laboratory at Palo Alto, adding 10,000 sq. ft. of floor space and increasing employees from 70 to 140. Construction will be done by Stanford University, which leases the facility to General Electric.

BUY OLD DUTCH — Purex Corp., South Gate, acquires Old Dutch Division of Cudahy Packing Co. in stock and cash transaction.

PAPER PLANT IN FULLERTON — Kimberly-Clark Corp. begins construction of 350,000-sq. ft. plant for manufacture of creped wadding products, to be completed in February 1956.

HAMMOND OFFSPRING — Hammond Manufacturing Co., Pasadena aircraft and missile equipment manufacturer, forms subsidiary, Air Logistics Corp., to specialize in production of aircraft and missile support equipment developed by Hammond. New company will start out with assembly operation in LaVerne, Calif.

MORE FIRE EXTINGUISHERS—General Pacific Corp., Culver City, is building 17,800-sq. ft., $100,000 addition to its plant for manufacturing fire extinguishers, to be completed in July.

MORE ROOM AT TOPP—Topp Industries, Inc., Los Angeles, will build $700,000 addition to its plant before September, tripling facilities to 54,000 sq. ft. Company manufactures aircraft electronic devices.

GYPSUM PLANT — Pabco Products, Inc., begins construction of new plant in Newark for production of gypsum wallboard, lath, and sheathing. Company is also expanding its gypsum plant at South Gate, and recently purchased gypsum deposits at Lovelock, Nev. Projects total an initial investment of about $2,500,000.

CROCKER ADDS OPERATION — H. S. Crocker Co., Inc., San Francisco, buys folding box plant of Rossotti Lithograph Corp. in San Francisco and enters into reciprocal agreement to manufacture all lithograph folding boxes for Rossotti at its San Bruno plant, while Rossotti will manufacture all folding boxes for Crocker's eastern distribution at North Bergen, N. J.

GIANNINI DATREX—G. M. Giannini Co., Pasadena, forms new division to manufacture digital data handling systems, to be housed in newly built 15,000-sq. ft. leased facility and to be called Giannini Datrex division.

BUY JEFFRIES — Zinsco Electrical Products, Los Angeles, acquires Jeffries Transformer Co. Both are manufacturers in the switchgear and transformer field.

FRUEHAUF LOOKS AHEAD — Another West Coast trailer plant will be added by Fruehauf Trailer Co. in the near future, according to Roy Fruehauf, president. Company now has two plants in Los Angeles and one in Seattle.

DOUBLING PLANT SIZE — United States Rubber Co. will build 89,920-sq. ft. addition to its Santa Ana foam rubber plant for production of foam rubber mattresses and furniture cushioning.

CANS FOR PAINT COMPANY — Sherwin-Williams Co., Cleveland, starts construction of $1,500,000 can manufacturing plant at San Leandro. Plant, to be in operation in November, will have capacity of 50,000,000 cans per year, supplying needs of company's Emeryville and Los Angeles paint and chemical operations, as well as sales to other paint manufacturers and motor oil producers.

SELL COSMETICS FIRM—Controlling interest in Anatole Robbins, Inc., Hollywood cosmetic manufacturer, is acquired by Donald A. Breyer, vice president of Fairfax, Inc., advertising agency.

JOIN LITTON GROUP—Litton Industries, Inc., Beverly Hills electronics manufacturer, acquires through exchange of stock Ahrendt Instrument Co. of College Park, Md., manufacturer of automatic control equipment, employing 175 persons.

AEROQUIP - MARMAN — Aeroquip Corp. of Jackson, Mich., acquires Marman Products, Inc., Los Angeles manufacturer of Marman clamp and related products for pipes and conduits.

NEW TEST CELL AT RYAN—Ryan Aeronautical Co., Sas Diego, puts into service newly built jet engine test cell, designed to handle engines with static thrust output as high as 35,000 lb. Load-measuring equipment was manufactured by Baldwin-Lima-Hamilton Corp. of Philadelphia. Main building is 40 x 70 ft. and 40 ft. high; a separate structure houses control room.

Ryan is awarded contract for more than $1,000,000 covering production of afterburners to be used on new Wright jet engine for Curtiss-Wright Corp.

NEW FIGHTER PLANE — Northrop Aircraft, Inc., Hawthorne, reveals that it is building new version of twin-jet Scorpion fighter plane, known as F-89H, for Air Force.

CONVAIR ORDERS MARS — Solar Aircraft Co. receives contract covering Mars gas turbine airborne generators from Convair Division of General Dynamics Corp., to be used on Convair C-131B "flying electronic laboratories." Two Mars power units will be installed on each plant, hung from the wings in fiberglas pods, and will supply power for electronic equipment being tested.

GROUND WORK FOR AiRESEARCH —AiResearch Industrial Division of Garrett Corp. in Los Angeles is building turbochargers for heavy-duty diesel engines under a muti-million dollar order from Caterpillar Tractor Co. of Peoria, Ill. Units have been field-tested for over a year on Caterpillar crawler tractors and other earth-moving equipment and are reported to supply a major boost in output of diesel engines.

HARNESS UP PLANT — Southern California Edison Co. puts into operation first unit of its El Segundo steam-electric generating station, which produces 160,000 kw. Second unit is scheduled to open in late 1956, completing the station, which will represent an investment of about $45,000,000.

CONTRACT FOR URANIUM MILL—Verdi Development Co., Uranium Division, awards contract for process engineering, plant design, and construction of its mill at Soledad Mountain, Calif., to MacAfee & Co., Los Angeles. MacAfee & Co. will also direct exploration and mining operations.

PLANS FOR COMPTON — Martin Bros. Box Co., wire-bound box manufacturers with West Coast plants in Oakland, Ore., and Whittier, Calif., acquire 52-acre site in Compton, Calif., for planned lumber re-working and container manufacturing plant.

NEW PRODUCT FOR WEST—California Metal Enameling Co., Los Angeles, installs new equipment and production lines, at cost of over $50,000, for production of porcelain enameled aluminum—reportedly first facilities of this kind on West Coast.

NUCLEAR POWER PROPOSAL—Nuclear Power Group, made up of seven companies interested in development of electric power from nuclear energy—including, in the West, Pacific Gas and Electric Co. and Bechtel Corp., presents plan to Atomic Energy Commission for joint backing of a full-scale nuclear power plant financed entirely with private funds. Plant, to be located in Illinois, would be owned and operated by Commonwealth Edison Co., major financial backer; General Electric Co. would be prime contractor; and Bechtel Corp. would act as engineer builder. Other participating members of Nuclear Power Group, Inc., would contribute toward cost of project in return for technical information and training in construction and operation of a full-scale nuclear plant. Project would be completed in five years, at a contract cost of $45,000,000.

ELECTRONICS CENTER — Cardstedt Research, Inc., is building first unit of a projected $1,750,000 industrial center for the electronics industry on 10-acre site in Long Beach. Facilities will be leased to individual firms, and will eventually include an administration building, laboratory, cafeteria, and central 24-hour switchboard.

PLANT IN NORTH HOLLYWOOD—Technology Instrument Corp. of Calif. moves into new plant in North Hollywood and expands its operations, formerly engineering service, to the manufacture, assembly, testing, and inspection of precision potentiometers.

CLARY-AVRON — Clary Corp., San Gabriel, buys Avron Corp. of Long Beach, aircraft valve and pressure regulator manufacturer, to be incorporated into its expanding Aircraft Division. Production is moved from Long Beach plant to Clary main factory in San Gabriel.

PIPELINE OPENS—Union Oil Co. of Calif. puts into operation its 65-mile-long, 12-in. pipeline carrying crude oil direct from wells in Ventura County to company refinery at Wilmington. Normal capacity of line is 50,000 bbl. per day, which can be increased to 70,000 by installation of a midway booster pumping station.

COLORADO

MOVE FROM BUFFALO — Stanley Aviation Corp. will move its entire operation from Buffalo, N.Y., to Denver, where it set up a branch in January 1954 for development and manufacture of emergency escape equipment for jet planes. When Buffalo plant closes, Denver headquarters will also take over electronic-mechanical work, principally on aircraft training devices. Move will be completed by August. Working force is expected to increase from present 250 to 350 or 400 by late fall, and of these all but 20 or 30 key employees will be locally recruited.

YENTER PLANT AT WORK—Natural gas processing plant built by Ginther, Warren, and Ginther near Sterling is now in full operation, producing natural gas, propane, butane, and natural gasoline. First unit was put in service a year ago, and others have been completed at intervals since then.

AEC CONTRACT AWARD—Contract to build and operate proposed uranium processing mill at Edgemont, S. D., is awarded by Atomic Energy Commission to Mines Development, Inc., of Denver, organized by group of young engineers and headed by George T. Bator, Colorado School of Mines associate professor. Newcastle, Wyo., was at one time considered as a possible site for this processing mill, which is now sited at Edgemont, S. D.

IDAHO

CONTRACT FROM BOEING—Baxter Foundry Co. of Boise receives subcontract from Boeing Aircraft Co. Seattle, covering machine tooling of parts for pneumatic system of B-52 bombers.

MONTANA

ADD AT TRIDENT—Ideal Cement Co. will add new production unit at its Trident operation, to cost an estimated $6,000,000, which will reportedly double output.

NEVADA

KENNECOTT PROJECT — Nevada Mines Division of Kennecott Copper Corp. sets up new department to study concentrator metallurgy, headed by Donald R. Gunther. Research on improved extraction and production of better smelting product will be the primary function of the new department.

NEW MEXICO

BUY ALBUQUERQUE PLANT—ACF Industries, Inc., buys plant in Albuquerque which it has leased for two years from Eidal Manufacturing Co. and plans $2,500,000 expansion of facilities for classified heavy industry operation performed for Atomic Energy Commission. Company will reportedly sell completed plant to AEC, which it will then serve as a prime contractor.

OREGON

EXPANDING GAS LINES—Portland Gas and Coke Co. undertakes $16,000,000 construction program of gas distribution system, anticipating arrival of natural gas in Portland area in summer of 1956.

INK—California Ink Co. is building $183,000 plant in Portland.

OFFICE AND WAREHOUSE—North Pacific Canners and Packers, Inc., plans to build new office and cold storage warehouse in Portland with investment, including equipment, of about $400,000.

PORTLAND PLANT — North Coast Manufacturing Co. will build one-story $100,000 plant on 10-acre site in Portland, to consolidate operations now at two plants in city.

CONTRACT ON SHEATHING PLANT — Willamette Valley Lumber Co. awards contract for construction of its new sheathing plant at Dallas to L. H. Hoffman and Son, Portland. Amount of contract is believed to be in neighborhood of $1,000,000. Plant will be completed before September.

UTAH

STANSBURY SALT GROWS—Expansion program estimated at cost of $40,000 is completed by Stansbury Salt Co. of Salt Lake City, covering installation of salt blocking press; additions to building used for blocking, mixing, and storage; construction of railroad spur; and pumping and pond improvements. Leased office and warehouse space is added in downtown Salt Lake City. Company manufactures salt products for feed, livestock, water softener, and industrial uses.

BUY PROVO PLANT—Pipe Line Service Co., Chicago, purchases for reported $300,000 plus, plant of Provo Foundry and Machine Co. at Provo, and will add equipment amounting to $500,000 for processing steel pipe against underground corrosion. Plant output will be about 1,000 carloads annually of pipe in sizes from ¾ in. to 30 in.

FIRE-BRICK PLANT FOR UTAH—General Refractories Co. builds new fire-brick plant next to its present silica brick plant at Lehi, said to be first facility for production of quality fire-brick in the state.

PLANT ON SWAN ISLAND—Transitier Truck Co. moves to new location in Portland for expanded manufacture of fork lift trucks.

NEW PRECISION CASTPARTS BUILDING—Precision Castparts Co. opens new 48,000-sq. ft. plant in Portland, providing more than double the capacity of its former building. Facilities reportedly include custom-built wax injection, centrifugal casting, and induction melting equipment, with a 100-kw. motor generator set for large-production melts; complete tool and die making equipment; metallurgical laboratory; and inspection department equipped with x-ray, Magnaflux unit, and optical comparator.

WASHINGTON

HANFORD ADDITION — Atomic Energy Commission awards $1,392,985 contract for building additions onto two pumping plants at Hanford to Hoffman Construction Co., Portland.

NEW PAINT COMPANY—Jones and Porter Paint Manufacturing Co., new firm organized in Spokane by former officials of General Paint Corp., begins production at the rate of 800 gal. per day.

UTILITIES FORECAST — Report to Puget Sound Utilities Council made by Jack D. Stevens, consulting engineer, blueprints program of power expansion for Puget Sound-Cascade area representing joint investment of $670,000,000 in new electric power generation, transmission, and distribution facilities. Council, established in 1954, is made up of Seattle City Light, Tacoma City Light, Puget Sound Power and Light Co.., Snohomish County Public Utility District, and Chelan County Public Utility District.

GLAZED TILE — Washington Brick and Lime Co. plans to build $400,000 structural glazed tile manufacturing plant at Dishman, adjoining company's brick tunnel kiln which has been in operation for five years. New operation will also produce unglazed tile and glazed brick. Plant is scheduled to be in operation by next year.

KRAFT PAPER PLANT—St. Regis Paper Co. will build $20,000,000 kraft paper plant at Tacoma, near its present plant for manufacture of pulp, paper bags, and other products.

CHANGE IN NAME ONLY—Everett Pulp and Paper Co., acquired in 1952 by Simpson Logging Co., is renamed Simpson Paper Co., continuing present management and personnel.

BUY LANG & CO.—Metal Fabricating Division of Lang and Co., Seattle, is acquired by United Fabricators, Inc. New organization is operating 12,000-sq. ft. plant in Seattle for fabrication of stainless steel and other light metals, employing 21 persons.

CINNABAR RUSH? — Mining and chemical companies in state of Washington are reported to be checking up on cinnabar properties in vicinity of Morton, with the prospect of resuming mercury smelting activity from the cinnabar ore.

WYOMING

RECONSIDER—General Services Administration reopens problem of disposing of federal alumina plant at Laramie by inviting new bids for plant from Ideal Cement Co., Denver, and Monolith Portland Midwest Co. GSA accepted Ideal's $1,200,000 bid for plant last September, in a decision which has been protested by Monolith.

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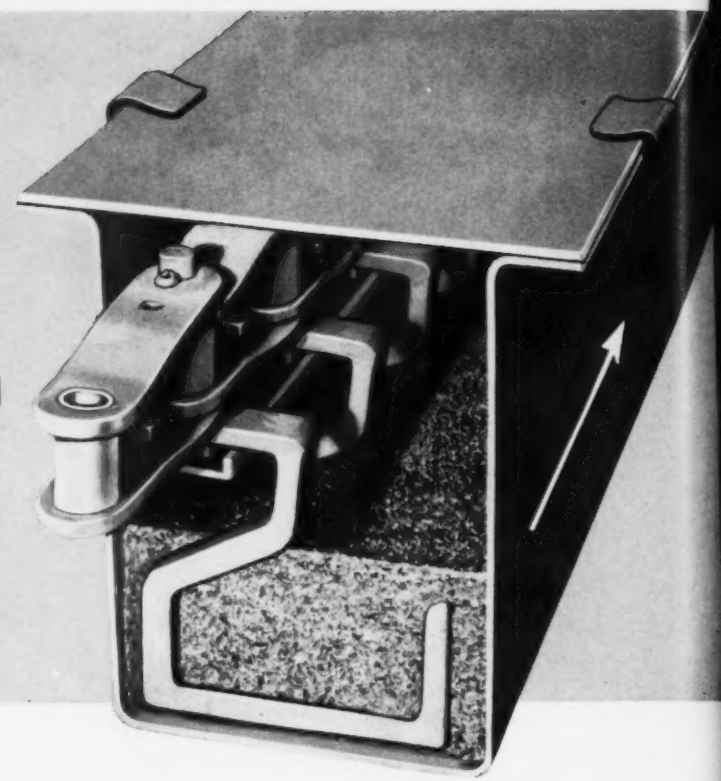

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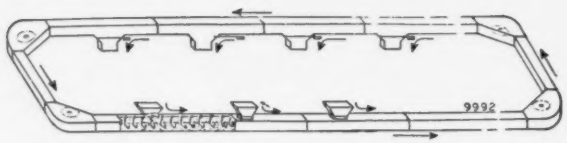

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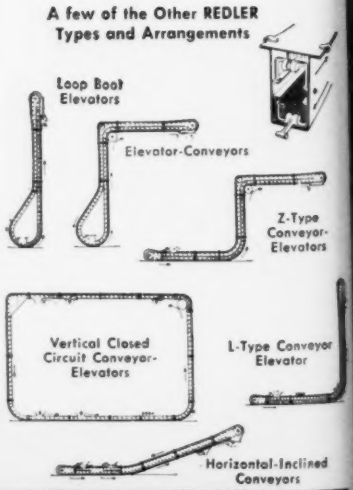

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